AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

In This Issue . . .

1952 Lincoln and Buick Features · · · Army M8E2 Cargo Tractor · · · Tank Hull Production · · · Saginaw Hydraulic Steering Gear · · · Fiat Jet Plane Design · · · · Dual-Fuel Carburetion Tests

JANUARY 15, 1952

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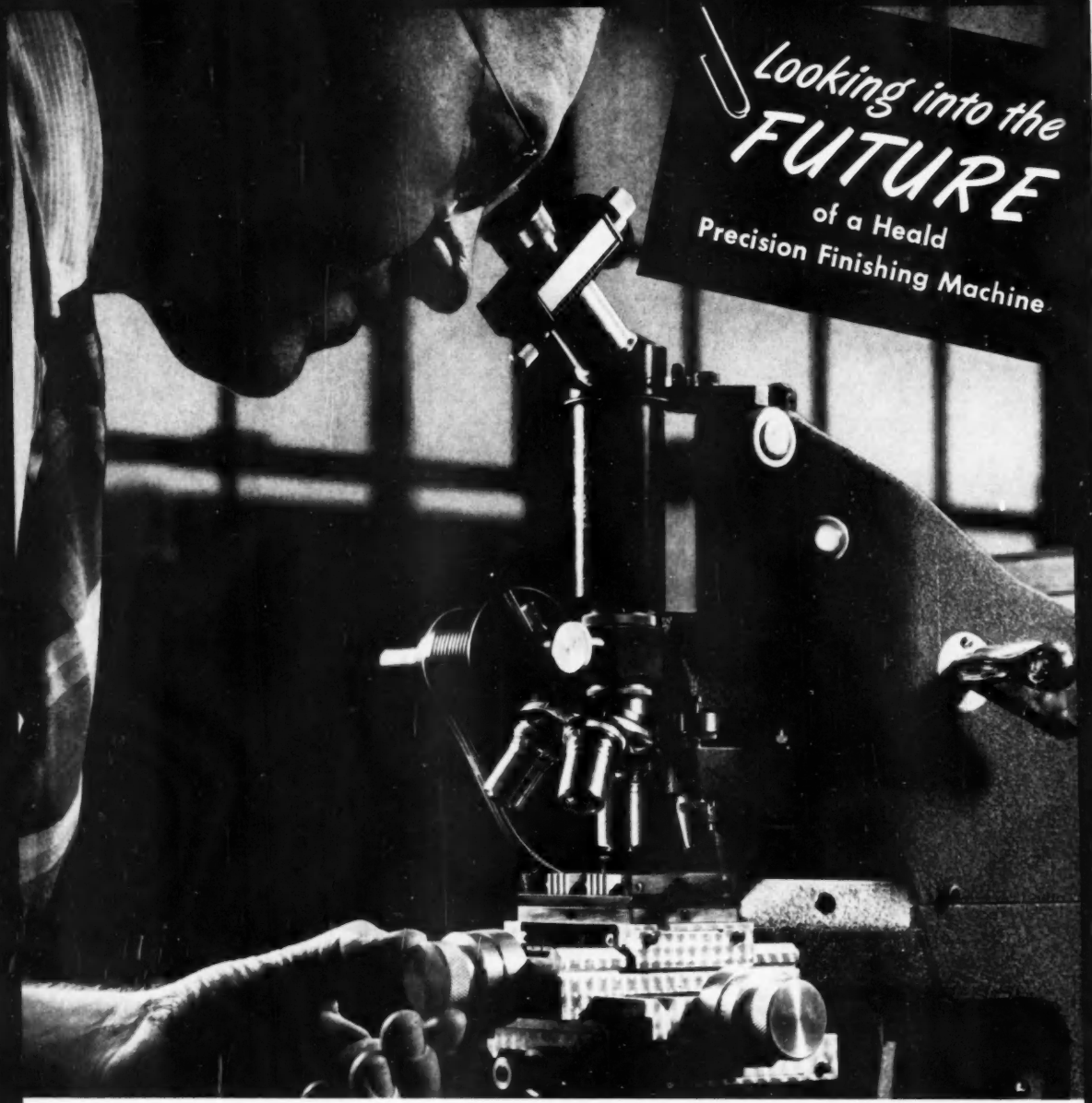
A CHILTON PUBLICATION



THERE'S no guesswork about predicting the performance of a Heald machine. Heald engineers see to that—literally as well as figuratively. Here, for example, a skilled technician examines metal surfaces which have had the Tukon hardness test. Whether these metals are to be used in a Heald machine—or are to be *precision finished* on a Heald machine—the end result of this painstaking research is the same. *More precision* for your future production of essential machines and components. This is just one of the endless tests carried on in Heald's research department, to keep Heald Bore-Matics, Internal Grinding Machines and Rotary Surface Grinding Machines years ahead in design and performance.

HEALD

Heald machines speed the nation's production

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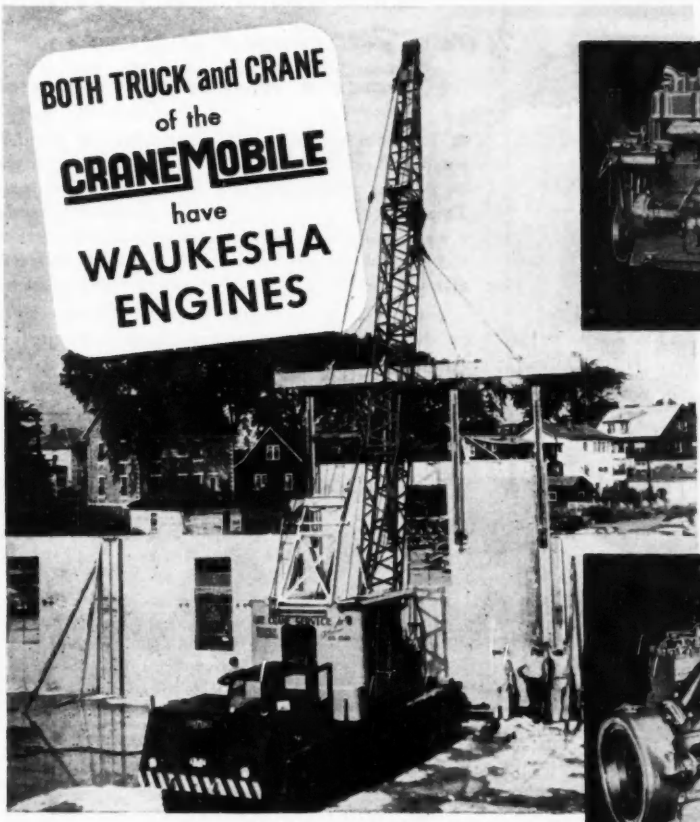
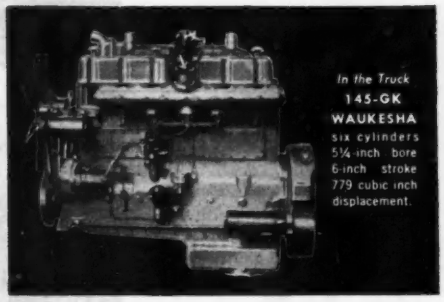
walls that walk...

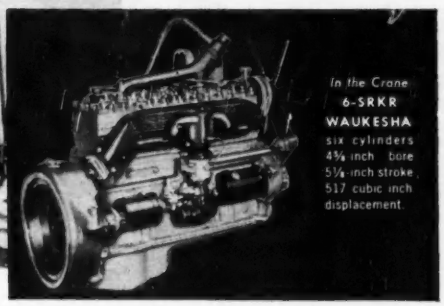
WITH WAUKESHA POWER





In the Truck
145-GK
WAUKESHA
six cylinders
5¼-inch bore
6-inch stroke
779 cubic inch
displacement.

Salem, Mass.—a precast 12½-ton wall section being "walked" into position at the Sylvania Electric Co. plant by a Waukesha-powered 25-ton 190-T61 Bay City CraneMobile owned by Lee Crane Service, Inc., Boston, Mass. Plant is being built by National Industrial Construction Co., Palo Alto, California.



In the Crane
6-SRKR
WAUKESHA
six cylinders
4⅜-inch bore
5⅛-inch stroke
517 cubic inch
displacement.

● The contractor here knows how to speed up construction. Using the 25-ton CraneMobile, he is getting precision handling, with precision power —Waukesha power!

And Bay City engineers-in that power with two Waukesha Engines—giving the contractor a balanced mechanical unit—a two-way combination of a rugged mobile carrier with a versatile crane.

The truck carrier—with its 145-GK Waukesha Engine—has not only the power, but the speed and mobility for the job, and the fast, reliable roadability to take it there.

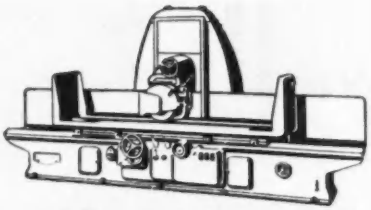
The crane—with its 6-SRKR Waukesha Engine—handles heavy loads, high lifts and long reaches *dependably*—on any construction and erection job.

The contractors' mobile equipment is Waukesha-powered to pay profits—in performance dependability, in fuel economy, in low up-keep, in long life.

Get Bulletins 1186 and 1124. 159

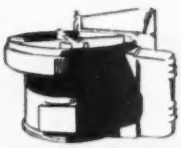
WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. • NEW YORK, TULSA, LOS ANGELES

MATTISON GRINDERS

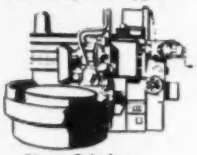


Precision Surface Grinders
Horizontal Spindle

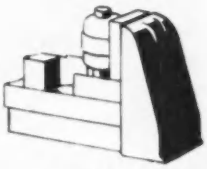
Disc Grinders,
Double Spindle Type



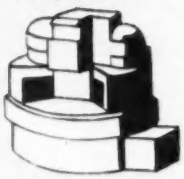
Vertical Spindle
Disc Grinders



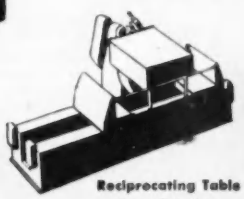
Plano Grinders,
Rotary Table Type



Rotary Table
Surface Grinders

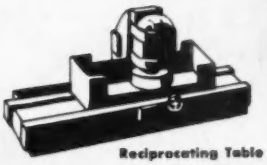


Automatic Rotary
Surface Grinders



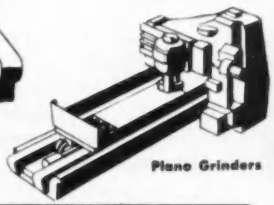
Reciprocating Table
Face Grinders

Disc Grinders,
Single Spindle Type



Reciprocating Table
Surface Grinders
Vertical Spindle

Face Grinders,
Traveling Wheel



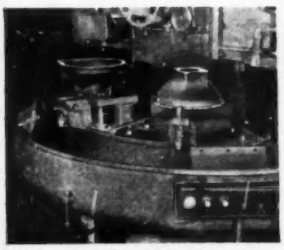
Plano Grinders

If its a Flat Surface to Grind There's a Mattison to Grind it.

● The comprehensive "Mattison Line" of grinders enables Mattison Machine Works to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work and enables our engineers to recommend the particular type of grinder that will give you maximum accuracy, production and economy.

For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

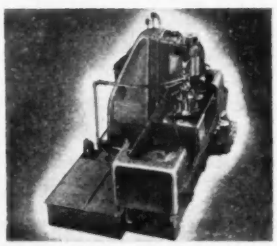
For catalogs on any of the types shown or if you would like a copy of the general bulletin, let us know and we'll gladly send them to you.



200 Transmission Case surfaces ground per hour on Mattison (Hanchett Type) Rotary Automatic Grinder. A special 8-station mechanical fixture permits one operator to grind each end of this large 35 lb. casting, flat and parallel. Stock removal .050".

Grinding cast-iron cams — 5" diameter, 1½" thick — stock removal, each side .030". Production, 120 surfaces per hour on Mattison (Hanchett Type) Rotary Surface Grinder.

2½ ton machine-bed ground in 60% less time on Mattison Precision Surface Grinder than required by former method, hand scraping.



The No. 24 Duplex is equipped with two rotary tables. Where loading time is about the same as grinding time this machine can practically double production.

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

January 15, 1952 Vol. 106, No. 2

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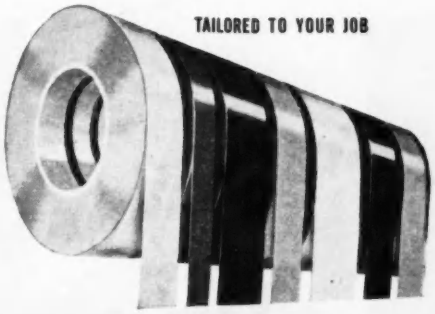

Moisture and dirt are kept out with Polyken Waterproof Tape No. 214, for safe shipment of engine blocks overseas.

How Studebaker seals engines for export

Studebaker engine blocks for overseas shipment must be packed so as to prevent internal collection of dust and the formation of rust. Yet they must be packed fast to hold down time and labor costs.

Studebaker does it by sealing engine block openings with pressure-sensitive waterproof Polyken Tape No. 214. Engine parts are packed in corrugated containers, and these, too, are sealed with easy-to-handle Polyken No. 214.

Polyken No. 214 meets government specifications JAN-P-127 Type 1 Grade B and AN-T-12A. It's black in color while other similar Polyken tapes are white and olive drab. All are fast, sure, economical.

Pressure-sensitive tapes today can do things you never thought tape could do. Send for free samples and booklet.

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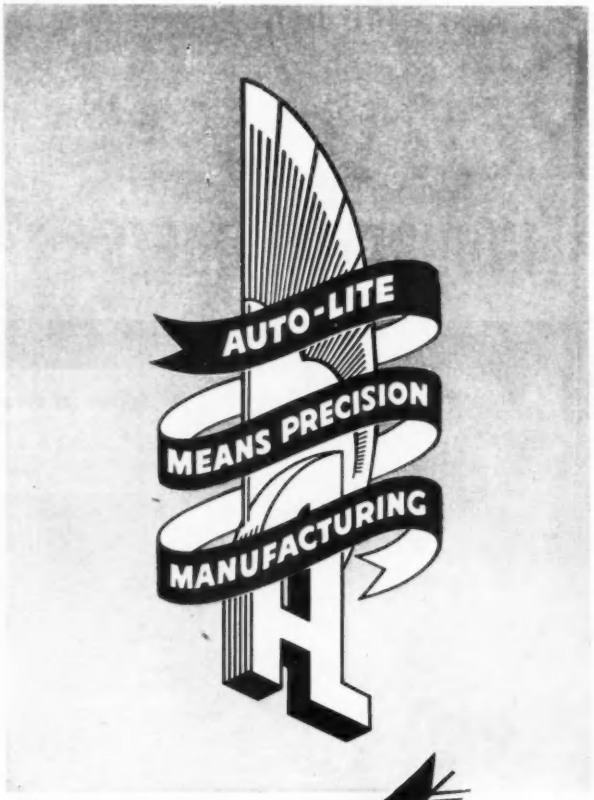

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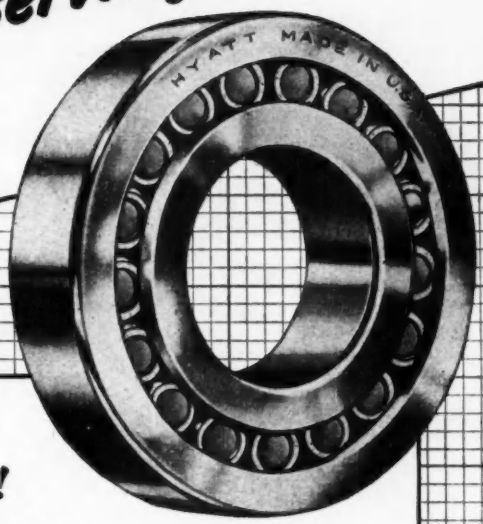
1892–1952

60 Years serving industry



. . . and still going like sixty!

Continuing progress has marked the last fifty-nine years for Hyatt. But 1952, our sixtieth year, finds us expanding our facilities in anticipation of the greatest year in our history.

Plant extensions, under way right now, are adding valuable manufacturing space at Harrison, and additional construction will double the available floor space at our second plant in Clark Township, New Jersey.

These new improved facilities and additional equipment combined with traditional Hyatt manufacturing skill help satisfy the ever-increasing demand for dependable Hyatt Roller Bearings.

To our many friends in the agricultural — textile — petroleum — construction — automotive — railroad — aviation — steel — material handling—and other fields, we again say "Thank You" for your continued use of Hyatt Roller Bearings.

And we intend to keep on "going like sixty" in every department to furnish better roller bearings in ever-increasing quantities to meet your requirements. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; Chicago; Detroit; Pittsburgh; Oakland, Calif.

HYATT ROLLER BEARINGS

How United Air Cleaners
Get Outside Air Inside the Engine

High under-the-hood temperatures that cause vapor lock can be a real headache to truckers — particularly when high summer temperatures aggravate the situation. That's why United Specialties air cleaner designers working in close cooperation with Diamond T engineers developed a special oil bath air cleaner to combat this condition.

This air cleaner is mounted on the inside of the hood ventilating louvers in such a way that *cool outside air* is drawn into the carburetor instead of hot under-hood air. Thus the United Oil Bath Air Cleaner not only provides air that is over 99 percent dirt free, but also aids in eliminating vapor lock.

The above case is typical of many instances where United Specialties engineers are called upon to provide specialized air cleaner service. It is one of the reasons United builds over 260 different air cleaner models. We invite *your* inquiry.

Here is Diamond T truck Model 720 which is equipped with the louver-mounted air cleaner illustrated. United Specialties Company, working closely with Diamond T engineers, have pioneered in air cleaner designs utilizing outside-the-hood air.

UNITED SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION • CHICAGO 28
MITCHELL DIVISION • PHILADELPHIA 36
BIRMINGHAM 11, ALABAMA

★ AIR CLEANERS ★ METAL STAMPINGS ★ DOVETAILS
★ IGNITION AND TURN SIGNAL SWITCHES ★ ROLLED SHAPES

Ross HYDRAULIC POWER STEERING...SINCE 1942

Alert...
Responsive...
POWERFUL...

Ross Hydrapower
Model HP-70

HYDRAPOWER Ross

Now... **EASIER, SAFER STEERING FOR COMMERCIAL VEHICLES AND PASSENGER CARS**

In 1942... *Ross hydraulic power steering* was chosen to solve the Army's then toughest steering problem—the 50-ton tank retriever.

One of the latest developments in Ross' Hydrapower steering program is the *Model HP-70* pictured above.

Not only does *Ross Hydrapower* take the "Lion's share" of the physical effort out of steering—with increased safety—but *Ross Hydrapower* gives in fullest measure the *alert, responsive* quality known as "road sense" which has been an outstanding characteristic of *Ross Steering* for almost a half century.

At present *Ross Hydrapower* is "in uniform" with most current production devoted to military needs. As government requirements permit, *Ross Hydrapower* will bring new steering *ease, safety* and *satisfaction* to additional commercial vehicles and passenger cars.

Cam & Lever **STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

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- Reducing weight
- Excluding dust, grit, etc.
- Cushioning shock
- Filtering liquids
- Grinding and polishing gaskets, grommets, etc.
- Padding, packing, sealing

Felt is not "just felt." There is a vast difference in its manufacture and efficiency. Because Western Felt for over fifty years has not, and will not, depart from its policy of maintaining the highest possible quality in material and manufacture, its products, wherever they may be employed, are your insurance against product complaints due to a Western Felt component part.

Here are just a few of its features that you can always depend on: range from wool softness to rock hardness—never loses shape—does not ravel or fray—resists oil, water, heat, age, resilient, flexible, compressible—may be cut to extremely close tolerances for small parts—unsurpassed in uniformity.

Western Felt engineers with decades of experience in the use of felt stand ready to counsel you.

100F

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HOLES

where you want them!

Whenever your work involves punching holes in hard-to-get-at or irregularly spaced locations—there's another place where Hannifin "Hy-Power" Hydraulics can help you. This portable equipment with its variety of work tools can bring forces up to 100 tons (more in multiple) to the work as needed.

For instance . . . here a "Hy-Power" punch makes rivet holes on an accurate, easy and fast basis. Then, similar "Hy-Power" work tools take over for riveting. The Hannifin "Hy-Power" riveter cold-sets rivets to stay—quietly, at extremely low cost. This fast, finger-tip controlled operation squeezes each rivet to fill the hole completely . . . forces riveted members tightly together, work hardens the rivets . . . makes strong joints.

But "Hy-Power" Hydraulics are not limited to riveting. The basic high pressure "Hy-Power" generator and portable work tools are widely adapted for punching, forming, bending.

"Hy-Power" *portable punching on furnace radiator shell.*

"Hy-Power" *portable riveting on an assembly operation.*

WHAT IS "HY-POWER"?

The "Hy-Power" generator—heart of the "Hy-Power" Hydraulic System—combines motor, pump, oil reservoir, control valves and high pressure intensifier into a compact, self-contained unit to power production tools.

DESIGN ENGINEERS, TOOL SPECIALISTS

Investigate versatile "Hy-Power" equipment for your plant production operations. Write for "Hy-Power" Hydraulics Bulletin 150. Hannifin Corporation, 1143 S. Kilbourn Ave., Chicago 24, Ill.

do ALL you CAN do . . . with

HANNIFIN

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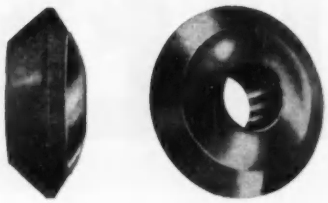
MACHINING FACILITY IS TANGIBLE

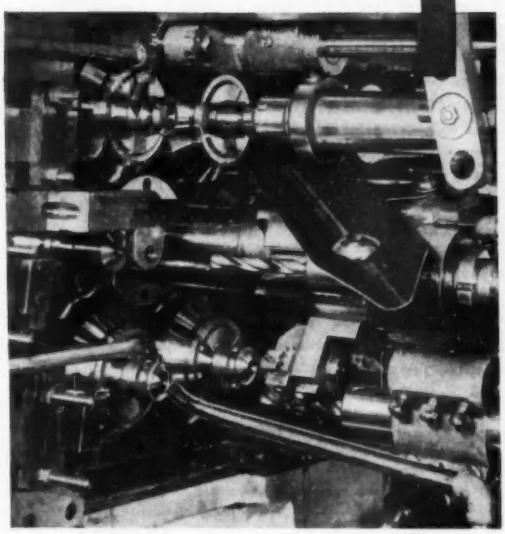


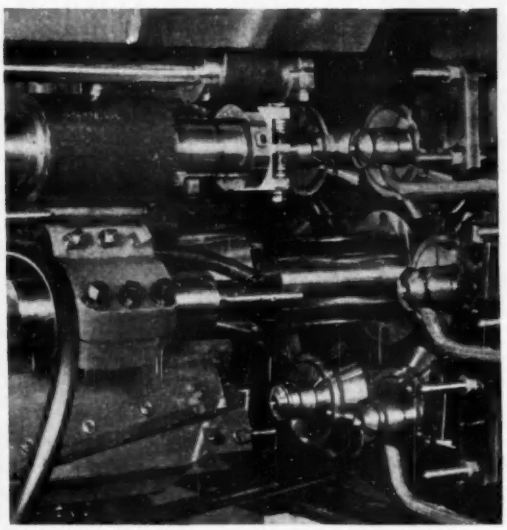
In the production of alloy steel bevel gear blanks on a 2⅝-SIX CONOMATIC, the "all position" endworking attachment facility simplifies the face and hole burnishing operations.

"AUTOMATICS" are good examples of mechanized teamwork. Their main function is to follow through and keep running. But a weak frame, a cramped tooling area, or an inadequate tool support, of one machine alone, can lower the production average of an entire battery.

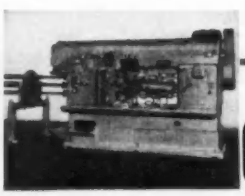
The extra values that pay off in an "automatic" are not just *wished* into the machine; they are *built* there. And only complete information will disclose whether or not they *are* built there. You may have complete information on CONOMATICS.

A Comparison of ALL Automatics is in favor of Cone

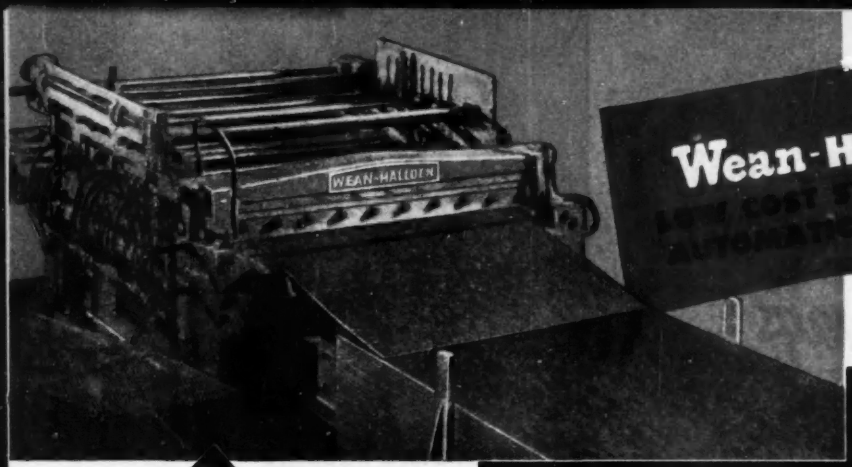




FRONT AND REAR SIDES OF TOOLING AREA



Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



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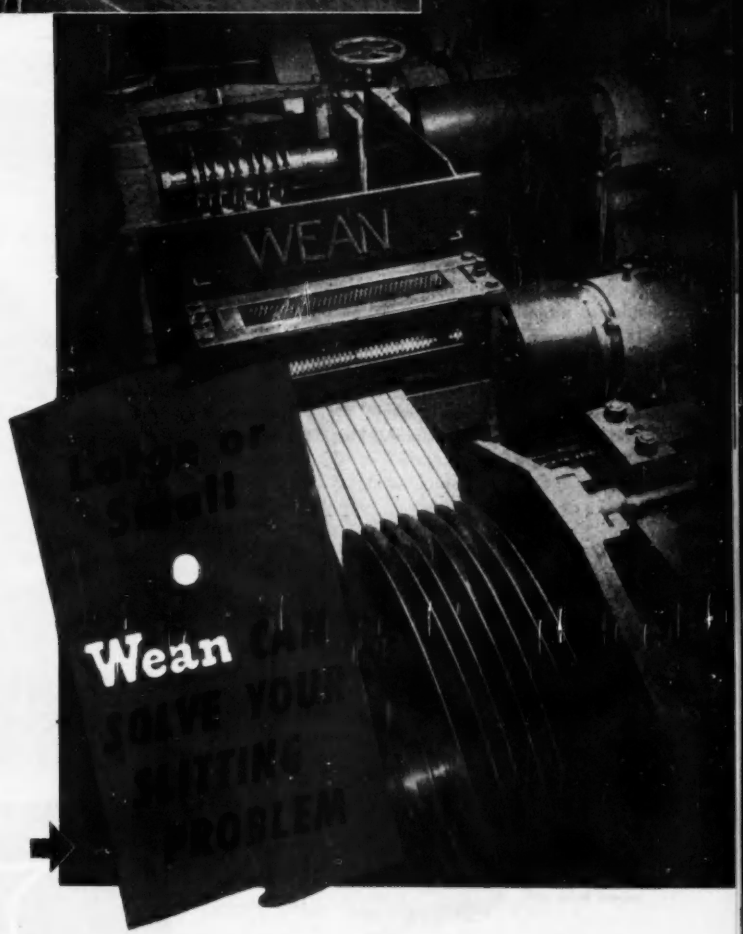

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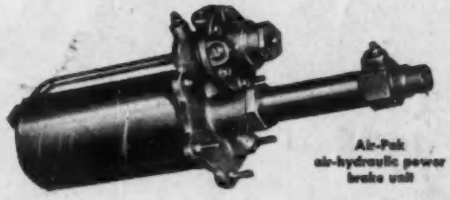
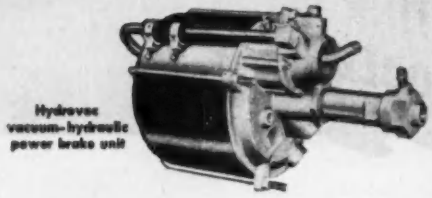
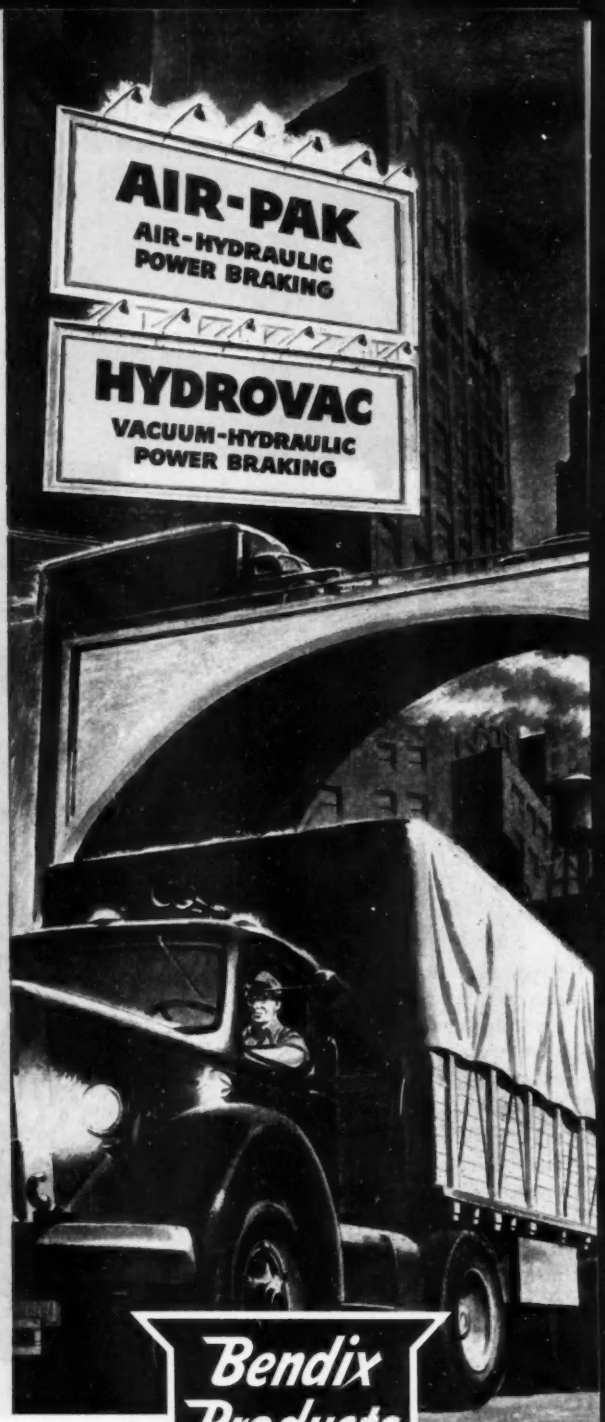


Air-Pak air-hydraulic power brake unit



Hydrovac vacuum-hydraulic power brake unit



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High Spots of This Issue

New Lincoln; New Buick

The interesting features introduced in the new 1952 models are here presented in two detailed articles. The Lincoln offers overhead-valve engine, chassis with ball joint front suspension, and redesigned frame. The Buick boasts a four-barrel carburetor and optional power steering. See pages 34 and 44.

Tank Hull Output Upped

At the Eddystone plant of the Baldwin-Lima-Hamilton Corp. new techniques have sharply upped tank hull production. Important information in this timely article has been cleared by the Military Security Branch of the Dept. of Defense. Turn to page 38.

Fast Economical Descaling

International Harvester has made a thorough investigation of the removal of surface scale from metal parts by means of induction heat. This account discusses tests carried on at the Farmall Works. Page 43.

Dual-Fuel Carburetion at High Compression

Following recent development of a more efficient experimental dual-fuel carburetor put out by the Carter Carburetor Corp. —built especially for the GMC high compression test engine —a study of the combination was conducted by the Motor Fuels Evaluation Div. of the Northern Regional Research Laboratory. Results obtained both on the dynamometer and in road tests are here presented. Page 46.

Saginaw Hydraulic Steering

Read about the construction and operation of this unique type of hydraulic steering gear, adopted as optional equipment on a number of 1952 passenger cars, as described and illustrated beginning page 51.

34 New Product Items
And Other High Spots, Such As:

A Fiat jet plane with top speed of 550 mph; fuel & tanks formed with hydraulic pressure; the Army's new cargo tractor; a special machine that punches slots in jet engine shroud rings; Defense contract awards and new Defense facilities; and the Business Pulse.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
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News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 106, No. 2 January 15, 1952

New Engine Tooling Order May Be Eased

There is some possibility that certain automobile manufacturers with new engines under development may yet be able to get the necessary machine tools to get them into production for 1953 models. It is reported that three companies which were well along with their tooling programs for new engines have been given some sort of priority relief, but details are not yet known.

These engine programs had been in jeopardy because of the National Production Authority order which prohibits delivery of machine tools to holders of unrated orders after Feb. 1. It is thought, however, that some arrangement may be in the works for the automobile companies to get their orders in the 30 per cent of machine tool production scheduled for holders of priorities which are not directly connected with the defense program.

New Rear Styling Visible in K-F Models for 1952

Kaiser-Frazer Corp. recently introduced the first of its 1952 Kaiser and Henry J cars. The new models are the "Virginian" in the Kaiser line and the "Vagabond" in the Henry J series. The spare tire on both has been moved to the back for a new rear styling treatment that is also said to increase luggage capacity by approximately 15 per cent. Increased overall lengths, new hood ornaments, chrome script insignia on the front fenders, and two-tone color combinations are other features of the cars.

Budd Co. Sales Reach New High

Budd Co. has reported that it reached the highest level of sales in its 39-year history during 1951. Defense orders for truck wheels, cabs, cargo bodies, artillery shells, parts for jet engines, tank hulls and turrets totaling $62 million have been received by the company. The firm is currently undertaking a $17 million expansion program.

THE 1952 CHEVROLET

As in the four-door Styleline De Luxe Sedan above, a number of improvements and refinements are offered in the remainder of the Chevrolet line for 1952. Foremost among the new features are greater comfort through redesigned engine mounts and shock absorbers and better performance under difficult operating conditions through refinements in carburetion. A new radiator grille, fresh ornamentation, and bright metalwork are said to give the car a lower, longer appearance. Eleven body types are offered in a wide variety of solid and two-tone color exteriors that harmonize with an extensive selection of interior fabrics. Optional Powerglide automatic transmission will carry an automatic choke.

Navy to Install Turbo-Wasp in Constellations for Tests

Pratt & Whitney Aircraft Div. of United Aircraft Corp. has announced that the Navy has chosen its T-34 Turbo-Wasp engine for installation in two Lockheed R70-1's (the Navy version of the new Super Constellation commercial transport) under a program designed to test turbo-prop-powered transport aircraft. It is claimed that the engine will give the R70-1 a payload of 35,000 lb and a long-range cruising speed of 394 mph at an altitude of 25,000 ft.

According to the company, the Air Force will also test the potentialities of turbo-prop-powered transports by installing four of the engines in a Douglas C-124 Globemaster with a payload increase of 25,000 lb. This latest version of the Globemaster will be known as the YC-124B.

The P & W T-34 Turbo-Wasp is a single-unit, axial-flow gas turbine engine which delivers power both to the propeller at the front of the engine and by jet thrust through a tailpipe at the rear. About 90 per cent of the engine's power is delivered to the propeller shaft, the remainder in jet thrust.

1942 or Older Cars Now Exempt from Terms of Regulation W

The Board of Governors of the Federal Reserve System announced recently that, effective Jan. 2, 1952, all 1942 and older model automobiles are exempt from the list of articles subject to the provisions of Regulation W (Consumer Credit). The action is not expected to exercise any marked effect on the general credit situation, since financing terms for older model cars have often been more stringent than those required by Regulation W.

News of the AUTOMOTIVE

1951 Aircraft Industry Report Shows Military Production Up

In a year-end summary issued recently. Admiral DeWitt C. Ramsey, president of the Aircraft Industries Association, estimated that between 4500 and 5000 military aircraft of all types were produced in 1951. Since first emphasis was placed on increasing production capacity rather than output, the industry did not achieve production rates comparable to those attained during World War II, when production of combat "end" items received generally over-riding priorities. The production figure above compares favorably with 3000 military planes produced in 1950. In this connection, it was estimated that the monthly production rate now is twice what it was at the end of 1950, or about 600 planes, and should rise to 1500 planes by the end of 1952.

Since it is planned to increase the Air Force to 143 wings and strengthen the air arms of the other services as well, Admiral Ramsey stated that a re-examination of plant and facilities capacity will be required. Furthermore, construction of plants and orders for machine tools and equipment to put them in a productive condition must be speeded during 1952, if increased production is to be achieved in 1953. He noted that, in spite of the huge sums appropriated by Congress for aircraft procurement, not a single combat aircraft has yet been delivered from orders placed after the start of the Korean conflict.

Although approximately 95 per cent of the aircraft manufacturing industry's efforts during 1951 were devoted to the production of military aircraft, it still managed to turn out 65 commercial transports, 50 twin-engined executive type transports, and 2300 light planes. These figures were, of course, somewhat below the levels attained in 1950, largely due to materials shortages and the preoccupation of manufacturers with direct military production activities.

Further indications of industry expansion during 1951 were: sales amounted to $2.5 billion, compared to 1950 sales of $1.809 billion; or an increase of 20 per cent; employment doubled to reach 600,000 and should be one million within another year; airframe manufacturers will shortly have in use 60 million sq ft of floor space to equal the World War II peak; and production in 1952 should equal World War II rates in airframe pounds, although not in numbers of planes.

Among important 1951 developments mentioned in the report were: the award of contracts for experimental atomic-powered aircraft; continued guided missile development in all categories and the award of contracts for production of several types; the readying for flight testing of two prototype long-range jet bombers; the design of new high-altitude interceptor planes; the introduction of a research aircraft whose wings can be moved forward and backward in flight; and the phenomenal growth of the helicopter industry.

Harvester Raises Prices on Light Truck Chassis

International Harvester Co. has announced increases in the list prices of some of its light models of motor truck chassis, effective Dec. 10, 1951. The increases apply to the L-110, L-120, L-130 and L-150 model series and range from 1.3 per cent on one model of the 150 series to three per cent on the L-130 series. Dollar increases amount to $30 on the L-110, $20 on the L-120, $40 on the L-130 and $20 on the L-150 models. Prices remain unchanged on the LB-140, L-160 and the LC-160 models.

Willys Shows Large Gain in Net Profit

Unlike most companies in the automobile industry, Willys-Overland Motors, Inc., showed a large increase in net earnings for its last fiscal year, ended Sept. 30, 1951. Profit for the period was $4,585,566, or nearly three times the $1,605,517 earned the preceding year. Unfilled orders and contracts pending amounted to $250 million as of last Dec. 15.

Contract for Tank Plant Is Awarded to ASF

A contract for operation of the Government-owned Cast Armor Plant at East Chicago, Ind., has been awarded to American Steel Foundries by Army Ordnance. The multi-million dollar contract covers both reactivation of the plant and production of tank hulls and turrets.

Automotive Rubber Acquires Plant in Houston, Tex.

Automotive Rubber Co., Inc., recently announced acquisition of the former Texas Tank Co. plant in Houston, Tex. The new facility will specialize in engineering, manufacturing, and installation of rubber insulated tanks of all kinds, tank cars, exhaust systems, pipe and other production and plant equipment, as well as mechanical rubber parts.

A FIGHTING MONSTER

Photographed at twilight for security reasons, a pilot model of the new giant T-43 tank, being built by Chrysler Corp. at its tank plant in Newark, Del., is said to be more than a match for any land-fighting machine ever built. (See Dec. 15 issue of AUTOMOTIVE INDUSTRIES, p. 32). Although design details have not been revealed, the tank is reported to be powered by an 820-hp engine and to weigh at least 50 tons. The exact date on which the tank will go into volume production has not been disclosed. Chrysler also plans to build a medium tank at its Newark plant.

AND AVIATION INDUSTRIES

Citroen to Introduce New Flat-Six Model

It has been reported by authoritative sources that the French firm of Citroen will market an air-cooled opposed flat-six car with front-wheel drive toward the end of 1952. Although the company is said to have paid much attention to direct fuel injection, indications are that this will not be adopted now because of servicing difficulties. The new four-passenger flat-six models will have a 60-hp engine with a maximum speed of approximately 100 mph, a four- speed, electrically controlled automatic transmission, and a combination of torsion bar and hydraulic suspension.

Boeing Activities Reached New Heights During 1951

In a year-end report issued recently, William M. Allen, president, Boeing Airplane Co., cited the year-long build-up of production of Boeing B-47 Stratojet medium bombers, the "roll-out" of the first XB-52 Stratofortress heavy bomber, and expansion of facilities for its production as highlights of the company's activities during 1951.

Summarizing Boeing production activity, Mr. Allen said that, in addition to B-52 and B-47 manufacture, the firm is also producing KC-97E Stratofreighter transport-tankers and is continuing its guided missile development programs begun in 1945. Activities in non-aircraft fields included continuing work on a small gas turbine engine now under limited production for the Navy, contracts for power line suspension clamps, development of an anti-fouling spark plug and production and sales of electronic analog computers.

The company's backlog in orders is reported as being approximately $1¼ billion. Some 42 per cent of the value of production work in progress is said to have been subcontracted.

Salmson Asks Courts to Survey Finances

Salmson Automobile Co., Paris, France, has ceased production and has asked the French civil courts to decide whether it should be reorganized, with a period in which to pay off its debts, or whether it should be pronounced bankrupt and finished. This is the second French automobile company that has been in financial difficulties this year, for Talbot was recently examined by the courts and given eight years in which to pay off its debts.

CHEVROLET TRUCK FOR 1952

The 1952 Chevrolet truck line includes this heavy-duty model with stake body, dual rear wheels, and a GVW of 16,000 lb. It is powered by a 105-hp, valve-in-head engine, which contains a number of improvements in carburetion to assure stellar performance under the most severe operating conditions.

Industry Proves Lack of Truth in Automotive Parts Charges

The automotive industry has come off with a clean record in its recent bout with a congressional committee that had charged it with excessive profits on automotive parts sold to Army Ordnance. Armed with carefully prepared testimony and statistics, industry spokesmen riddled the charges by the Hardy committee on Government spending that indirect selling of parts through the companies, rather than by suppliers, had cost the Army about $305 million a year.

In hearings held at Detroit, Mich., industry officials pointed out that committee investigators had failed to consider such costs as overhead, packaging, follow-up, accounting, inspection, and similar handling costs in computing the difference in cost between the supplier's price and that paid to the automotive manufacturer. They also explained that, if the Army had to do all the work of locating each individual item and assume the costs of all the functions performed by the industry, prices would actually be higher than they are now.

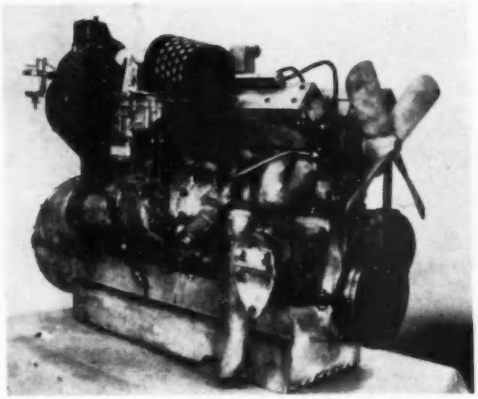
Testimony by Myrle St. Aubin, director of the General Motors Corp. Service Section, refuted completely an unfounded charge by the committee that GM made a profit of 35.9 per cent on products sold to the Army by its United Motors Service Div. He produced figures showing that gross profit on sales of more than $7.7 million to the Army amounted to only 6.9 per cent, or $532,000, and disregarding advertising entirely and figuring only normal overhead, the divsion actually lost $186,000, or 2.4 per cent. He added that the company as a whole, however, made a reasonable manufacturing profit on the Army business. He also stated that prices quoted to the military are always equal to or lower than the most favorable price to any other customer. If special packaging or specifications are required, these are added at the lowest possible cost.

It is believed that the industry presented its case so well that there will be little further criticism on the score of indirect selling. However, the committee is expected to make some recommendations concerning buying procedures at the Detroit Automotive Tank Center.

Marmon-Herrington Grants Rights to Belgian Firm

Marmon-Herrington Co. has announced the grant of foreign manufacturing and sales rights for electric trolley coaches to Les Ateliers Metallurgiques of Nivelles, Belgium. The licensing agreement provides for manufacture on a royalty basis with exclusive sales rights in certain European countries and open sales rights in other territories such as South America. The factory is located approximately 30 miles from Brussels and is said to be one of the most modern in Europe.

News of the AUTOMOTIVE



THE BUGATTI 101

The eight-cyl engine is fitted in a chassis equipped with either the Cotal electromagnetic four-speed transmission or a Bugatti five-speed box. It is being manufactured at the Bugatti factory near Strasbourg, France, which is gradually being re-equipped for the production of high-grade cars as funds, machine tools, and supplies become available.

Bugatti Reveals Details of Its "101" Engine

The Bugatti "101" (see cut above), a successor to the pre-war "57," is reported to be the only straight-eight engine now produced in Europe. It has a piston displacement of 201 cu in. and is built either with or without a supercharger. The power output of the former has been raised to 213 hp, while the latter develops 135 hp. The cylinder block features integral heads with a separate aluminum oil pan and is mounted on an aluminum crankcase. Valves are inclined in the head, and the two overhead camshafts have aluminum housings.

The camshaft drive is at the rear with a Rootes type blower on the right-hand side, a dual Solex carburetor mounted directly on it, and a generator and starting motor on the exhaust side. There is only one belt which drives the four-blade cast aluminum fan from a pulley behind a damper on the front end of the crankshaft. The gases are led from the exhaust manifold through a flexible pipe directly outside the frame member.

In addition to the "eight," Bugatti is working on a supercharged four-cyl sports model engine of 91½ cu in. with the bore and stroke approximately 3.07 in. by 3.15 in. This model has integral heads with the overhead valves operated by two camshafts. The camshaft drive is enclosed in a separate light alloy housing at the front, in contrast to the "eight" with its camshaft drive at the rear. The crankshaft is mounted in five main bearings. This model, known as the "102," will have a separate mechanical transmission and independent suspension in front by transverse spring and support arms. There will be two models—a four-passenger sedan and a sports model.

Chevrolet Again Leads Field in Car and Truck Production

Chevrolet Div. of General Motors Corp. took top honors again in 1951 as the largest individual producer of passenger cars and trucks with an estimated output of 1.5 million units. It was the 12th consecutive production year that the company has held top place in both the passenger car and truck fields.

The 1951 volume was second best in Chevrolet's history, although still 25 per cent below the previous year because of Government restrictions on materials. The division currently has several defense projects under way and is expanding its facilities. In addition to three Government-owned plants that the division is operating, its current building program will increase plant productive area by 2 million sq ft.

No Hoarding of Aluminum Found In West Coast Aircraft Plants

A U. S. Senate Small Business Committee investigating staff, assigned in the fall of 1951 to look into complaints of alleged hoarding of aluminum in the West Coast aircraft industry, recently reported that it found little evidence of excessive inventories at the six plants inspected. On the contrary, there appeared to be an honest effort to maintain inventories at the lowest possible levels.

The investigations were conducted at the Boeing Airplane Co., Consolidated Vultee Aircraft Corp., Douglas Aircraft Co., Lockheed Aircraft Corp., North American Aviation, Inc., and Northrop Aircraft, Inc.

Car Makers Seek Hike in Ceiling Prices

General Motors Corp. has asked price increases on its passenger cars ranging from 4.4 to 6.01 per cent under provisions of the Capehart formula in the controls law. Factory list increases on four-door sedans range from $60.54 to $103.29. If approved, however, the price to the ultimate buyer would be considerably more since the increase also would apply to the dealer markup.

The Office of Price Stabilization also has received applications for price increases from Kaiser-Frazer Corp. for from 24.33 to 28.48 per cent; Studebaker, 7.84 to 8.67 per cent; and Ford, 4.27 to 8.13 per cent. OPS has already granted an increase of nearly 4.0 per cent to Hudson.

Controls Cut Chrysler Output 42 Per Cent

The severe effect of production restrictions on the automobile industry is evident in a year-end statement by L. L. Colbert, president of Chrysler Corp. He said that at the end of 1951, passenger car production was running at a rate 42.5 per cent lower than in the early part of the year, and 51 per cent below the peak level of operations in 1950. He added that projected schedules permitted by the Government indicate Chrysler may produce about 257,000 cars and trucks, including military and other vehicles for the Government, during the first quarter of 1952.

Mexican Auto Production Evidences Sizable Drop

According to recent reports, automobile production in Mexico has dropped by 50 per cent in assembly plants established there, due to the U. S. rearmament program. Normally, Mexican assembly plants receive dies from U. S. manufacturers for production of parts assembled in Mexico.

The first 50 units of the Italian Fiat Model 1400 have arrived in Mexico and will be placed on sale in January. This is the model which ultimately will be manufactured in Mexico by a Mexican subsidiary in a plant to be established in Tepeapulco.

AND AVIATION INDUSTRIES

GE to Use Bomber for Testing of Turbojets

General Electric Co. recently revealed that it has placed in operation a jet-propelled "laboratory" for high-speed flight testing of turbojet engines of advanced design. The company's Flight Test Div. disclosed that the "laboratory" is actually a four-jet North American bomber which carries a fifth test engine in a special nacelle under the bomb-bay. It is reported that among the turbojets to be flight tested are the new J-73 and the J-47-GE-17 reheat engine.

According to the company, the engine nacelle of the bomber, which is partially retractable into the bomb-bay when not in use, will accommodate turbojet engines considerably larger than any yet announced. The plane has been equipped with a maze of special instruments to record every phase of the test engine's performance in flight.

General Electric also announced development of a low-cost electric locomotive, which can be mass-produced and is capable of handling important traffic on 90 per cent of the country's electrified lines, and a $5 million dollar expansion program at its silicone plant in Waterford, N. Y.

OPS Suspends Controls On Aircraft and Parts

The Office of Price Stabilization recently suspended from price control all sales of new and unused aircraft and of components, parts, and subassemblies which can be used only in aircraft. The order was accompanied by a warning that controls would be promptly reinstated if prices are not maintained at reasonable levels.

OPS also disclosed that the prices of major types of cutting tools are being reduced by most manufacturers to comply with ceiling price regulations. The reductions were said to amount to approximately five per cent generally, although prices on some items have been reduced by smaller or larger amounts.

No Specification Changes Seen Reported in 1952 Crosley Line

Crosley Motors, Inc., has reported that its line of passenger cars and commercial vehicles will continue in 1952 production without specification changes. On CD-Std and CD-Super 1952, models start Nov. 15, 1951, with Serial No. CD-400,001. Engine numbers continue consecutively with identification by serial number.

On Farm Road models FOR and FOR-1, commercial vehicles, 1952 serial numbers also start Nov. 15, 1951, with Serial No. FR-1001. Engine numbers continue consecutively with those of Crosley cars, and identification is made by serial number. Factory delivered prices on the FOR and FOR-1 are $1,025.25 and $871.78, respectively. The former includes the hydraulically operated drawbar and front and rear power take-offs, while the latter does not include these features.

It is interesting to note that Crosley passenger car models (CC, CD and VC) now are manufactured by Crosley Motors, Inc., whereas they were previously produced by Crosley Corp.

"Input-Output" Controls Opposed by Car Makers

There is likely to be a great deal of discussion shortly about the "input-output" theory. Briefly, it involves a new plan under discussion by Government officials for total control of the country's production economy. It is much too complicated to discuss at length here, but, in brief, it would list all producing industries together with the materials they require, their productive capacities, whom they buy from and sell to, and a mass of other data.

Simultaneous equations would be set up for use with an electronic brain which would automatically determine which company would build what in what quantity, what materials it would be alloted, and presumably the prices at which products would be sold.

The automobile industry is reported to be very much opposed to the plan, both from the long-range viewpoint of a rigidly controlled economy and from the more immediate standpoint of the tremendous amount of manpower required to do the paper work involved.

UAW Talks Escalator Clause for Pensions

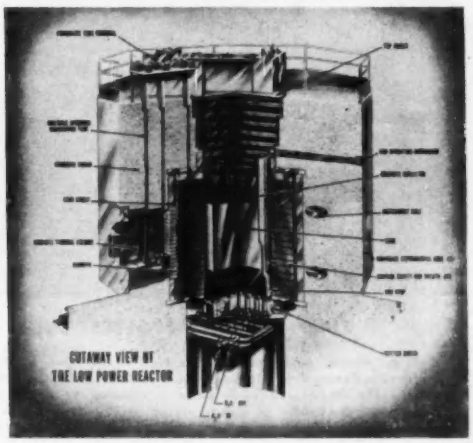
Walter P. Reuther, president of the UAW, has dropped a hint that his union may press for cost-of-living escalator provisions to be applied to pension agreements. At a recent party in Detroit for pensioned automobile workers, he said that present $100 to $125 a month pensions are insufficient and that the same escalator provisions should be applied to pensions as now are operative in UAW shop contracts. He did not reveal any details of his plan, however, or when it would be presented to the automobile industry.

Automotive Chemical Men Form New Association

A new trade association, Automotive Maintenance Chemical Industries, has been formed by a number of automotive chemical manufacturers. The organization, which will be identified by the initials "AMCI," will have its headquarters at 412 Fifth St., N.W., Washington 1, D. C. Officers are: president, R. E. Wait, Jr.; chairman of the board, S. V. Hirschman; and executive member, Frank M. Speaker.

PLENTY OF POWER

Seen here is a cut-a-way view of a low-power atomic reactor designed by North American Aviation, Inc., for the Reactor Development Div. of the Atomic Energy Commission. Using uranium for fuel, the reactor is said to be strictly a research tool for non-military use. It is claimed that the reactor can be operated at 160 kw, 40 hours a week, for 10 years on a single uranium charge.



News of the AUTOMOTIVE

Auto Industry Chiefs Haggle with Wash. Over Quota Cuts

The automobile industry ended 1951 and entered 1952 engaged in a fierce battle with Government officials over production quotas for the second quarter of 1952. With its production at year-end cut from 30 to 40 per cent below what it was at the beginning of 1951, the industry took a dim view of the National Production Authority's announced intentions to reduce output still further in the second quarter. At a heated meeting in Washington, D. C., Dec. 29, 1951, industry leaders laid the facts on the line before Government officials. The meeting was more than a management-Government session, since Walter Reuther, head of the UAW-CIO, and Governor G. Mennen Williams and Senator Blair Moody of Michigan represented the labor and political elements. All three battled to prevent a further cut in employment in Detroit and the rest of the state, which already has about 10 per cent of the total unemployment in the nation.

C. E. Wilson, General Motors Corp. president, told mobilization officials that production cuts for the first quarter of this year to 930,000 cars from 1.1 million units in the fourth quarter of 1951, already has resulted in mass layoffs and hardships in automobile centers and that proposed second-quarter cuts to 800,000 cars and 200,000 trucks would represent a 20 per cent reduction. The result would be the layoff of another 125,000 workers, in addition to the 135,000 already unemployed in Detroit. He said such an action would be unjustified on the basis of conserving steel for the defense program, since that metal is currently being produced at a higher rate than it is being fabricated into buildings and finished products.

In respect to copper, he said that the contemplated second-quarter production cut would save only a minor portion of the nation's copper supply, that there is reason to believe the requirements of military program are exaggerated, and that the copper supply availability to the U. S. has been underestimated.

Mr. Wilson pointed out that a production of five million cars and trucks for 1952 would amount to a 37.5 per cent reduction from the 1950 level and that it is the minimum which should be considered. He said such a program would save five million tons of steel and 174 million lb of copper. Furthermore, the industry through substitutions has saved approximately six lb of copper per vehicle, amounting to another 30 million lb, so that requirements at a five-million vehicle level this year would be 204 million lb less than was consumed in 1950.

The GM chief also pointed out to the Government officials that the car shortage created by lack of production during World War II has never been relieved, and it is this shortage that has kept used car prices high. He concluded his arguments with a proposal that the President appoint a special committee to determine the essential material requirements of the established military program, to examine the probable materials available to the country, and certify the amounts of these materials that it is reasonable to depend upon.

Whether or not the arguments of the industry were successful in either forestalling any cuts for the second quarter, or at least holding them to a smaller cut than had originally been planned, was still an open question early in Jan. It is certain that the problem cannot be immediately alleviated by shuttling more car contracts into Michigan, since tooling up would require several months.

Basically, industry representatives, labor interests, and the Michigan Governor and Senator agreed that automobile and truck production should remain at the same level in the second quarter as in the first—1,006,000 units. Actually, even this figure is misleading, since material is allocated for only 930,000 cars with the balance to be made up in material savings by manufacturers and through taking them from inventories. However, most industry officials agree that they do not have enough leeway to make up the difference, pointing out that they missed their fourth quarter quota of 1951 by about 30,000 units.

Another Government action expected by the automotive industry was the recent reshuffling of individual company quotas starting with the second quarter of 1952. NPA some time ago indicated that it would make readjustments to give a greater percentage of the industry total to companies with new cars, particularly Nash, Kaiser-Frazer, and Willys-Overland. With quotas for these three companies increased there is naturally some small lowering of quotas for the larger companies and some of the other independents, all of whom view the action with distinct distaste.

WORLD'S FASTEST DUO

A rather unusual photograph depicts the fastest known bomber and fighter in the world—the Boeing B-47 Stratojet and the North American F-86 Sabrejet—flying together. The former 185,000-lb plane is powered by six General Electric J-47 jet engines and is capable of speeds exceeding 600 mph. The latter, powered by one of the same type engines, holds the world's speed record of over 670 mph.

AND AVIATION INDUSTRIES

Dealers Show Concern at Sears, K-F Deal

While it still is too early to tell what effect merchandising of the Kaiser-Frazer Allstate car by Sears Roebuck will have on the automobile retail trade, the industry is watching the undertaking with considerable interest. Dealers, particularly, are viewing the venture with some concern, and the National Automobile Dealers Association has officially stated that the move represents a trend which should not be taken lightly by new car dealers.

There are several unique features of the arrangement between K-F and Sears, the most radical of which is probably the traditional Sears "satisfaction or money back" guarantee. While practically all dealers and automobile manufacturers lean over backward to satisfy the customer in case of complaints, none has yet gone so far as to offer to take back the merchandise and refund the customer's money.

Second, the company will warrant its own Allstate-brand batteries, tires, and spark plugs. Tires will be guaranteed for 18 months and batteries for 24 months.

Third, Sears also will accept trade-ins and establish service facilities with complete stocks of parts.

Another advantage the mail-order company will have will be the facilities of its own large financing subsidiary.

At present, there are no plans to expand the sale of the Allstate car beyond the present 17 cities in the South and Southwest, but industry observers believe that, if the venture proves successful, Sears eventually will merchandise the car in other sections of the country.

Ordnance to Store Tools in Mammoth Kans. Cave

Army Ordnance has leased a huge cave near Atchison, Kans., for the storage of specialized defense production equipment not yet needed in the present defense program. It is reported that the 14-acre underground warehouse will be used primarily for the storage of industrial tools.

Studebaker Leases Parts Building

Studebaker Corp. is reported to have signed a lease for a new building being constructed in Cheektowaga, N. Y. It will be used as a dealer parts and accessories distribution center.

FORD MOTOR CO. DEFENSE CONTRACTS

Product	Armed Service	Dated†	Plant Location	Estimated Peak Employment‡	Company Division
Wasp Major	Air Force	10/25/50	Chicago	15,000	Aircraft Engine Div.
R-4360 Aircraft Eng. Aircraft Engine Parts	For the Aircraft Engine Division	.....	Cincinnati	900	Automatic Transmission Div.
		.....	Rouge	2,200	Engine and Foundry Div. Metal Stamping Div.
Com'l Trucks, Buses	Army	1/25/51	All Ford Assembly and Hi Park	.....	Ford Div.
Tank Engines	Army	2/12/50	Rouge (Dearborn)	750	Engine and Foundry Div.
Bazooka Rockets	Army	2/22/51	Highland Park	700	Highland Park Div.
Medium Tanks	Army	3/6/51	Livonia, Mich.*	6,900	Tank Div.
Aircraft Fuel Injection Sys.	Air Force	3/31/51	Ypsilanti, Mich.*	2,700	Parts and Equip. Mfg. Div.
Jeep Study	Army	3/26/51	.....	.....	Engineering Staff
Gun Study	Army	3/1/51	.....	.....	Eng. and Foundry Metal Stamping Div
J-40 Jet Engines	Navy	4/23/51	Part in Wayne, Mich.*	1,900	Lincoln-Mercury Div.
B-47 Wings	Air Force	7/23/51	Claycomo, Mo.* (Planned as Assembly Plant)	10,000	Ford Div.

*—New Plants.

‡—Employment estimates projected as of late 1951 on the basis of present contract schedules. Subject to change depending on delivery of tools, completion of facilities, or schedule revisions.

†—Dates supply or facility letter contracts executed.

Ford to Need 40,000 War Workers at Peak

Ford Motor Co.'s defense commitments (see table above) at indicated production rates ultimately will require 40,000 employes and more than 11 million sq ft of factory floor space. When production reaches scheduled levels, annual dollar sales volume for defense products could reach $1.8 million. In a recent review of its defense activities, Ford stated that, of the actual funds released to the company by the Armed Forces, 65 per cent already have been committed to subcontractors and other suppliers for facilities, tools, service, supplies, and parts. Approximately 4000 companies are involved in the Ford subcontracting program, with more than 75 per cent of them small businesses employing 500 workers or less.

Products to be built by Ford for military use include the Wasp Major reciprocating aircraft engine, aircraft engine parts, commercial trucks and buses, tank engines, Bazooka rockets, medium tanks, aircraft fuel injection systems, the J-40 jet engine, and B-47 bomber wings. In addition, Ford also has two development contracts covering a new low-cost, light-weight jeep and small-caliber weapons.

Auto Industry Confronted by Wage Increase Feb. 1

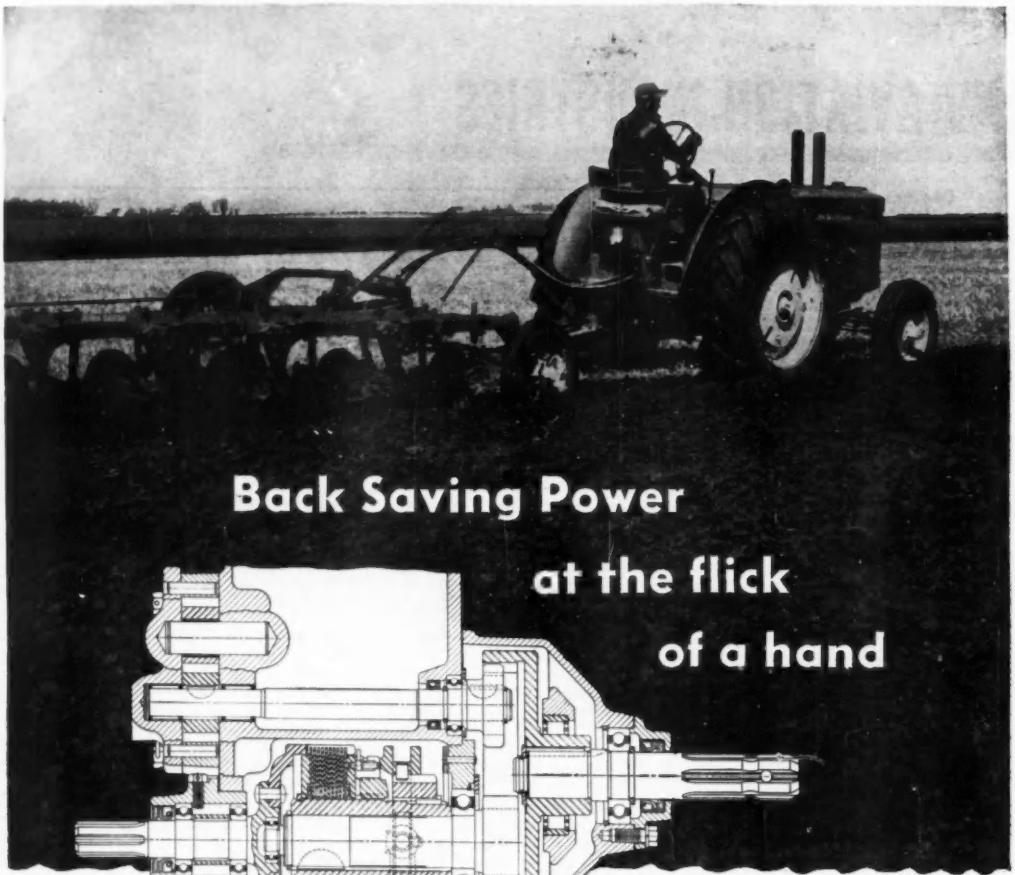
If the Bureau of Labor Standards consumers price index has not declined before Jan. 15, the automobile industry will be facing a wage increase under the cost-of-living provisions in all automobile labor contracts coming due Feb. 1. The Dec. 15 index stood at 189.3 and, when combined with a flat .8 per cent voluntary rent adjustment factor, hit an all-time high of 190.1.

In this connection, it is interesting to recall that when General Motors Corp. and the CIO concluded the cost of living agreement back in 1948, a table was set up relating index readings to wages. At that time, the table extended the index to 189.3, which was considered to be adequate to meet all conditions in the foreseeable future. Now the index has already pushed the table past what was then considered to be the highest likely point.

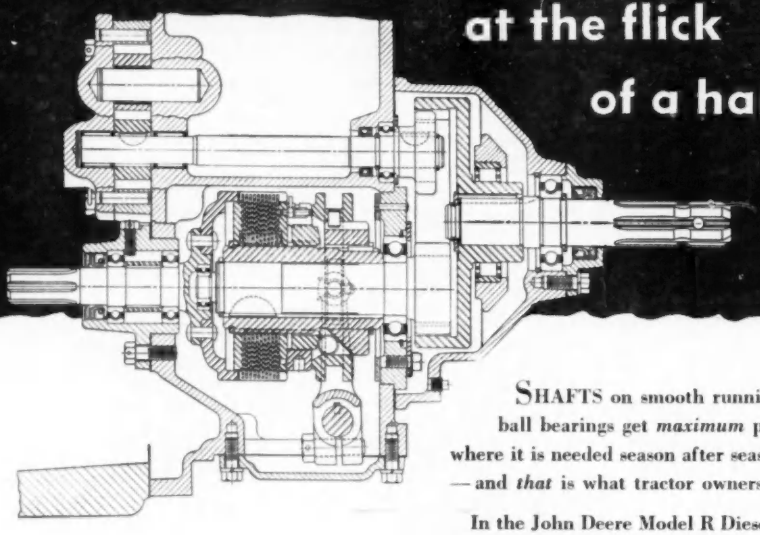
1951 Nickel Production Exceeds That of 1950

According to a recent statement by Dr. John F. Thompson, chairman and president, International Nickel Co. of Canada, Ltd., the free world's production of nickel for the full 12 months of 1951 will approximate 295 million lb, an increase of more than 10 per cent over 1950. He asserted that Canadian producers accounted for 275 million lb. Although reliable estimates of nickel production in Russia and its satellite countries are not available, it is believed that the free world's total is several times greater than that produced behind the Iron Curtain.

(*Turn to page* 140, *please*)



Back Saving Power at the flick of a hand



Direct engine-driven Power Take-off and Hydraulic "Powr-Trol" pump for operation of attachments to the John Deere Model R Diesel Tractor are engaged or disengaged at will by an independent clutch.

SHAFTS on smooth running New Departure ball bearings get *maximum* power right thru to where it is needed season after season without change — and *that* is what tractor owners really appreciate.

In the John Deere Model R Diesel, New Departures on the independent clutch, power take-off and hydraulic pump shafts assure back saving power at the flick of a hand for raising, lowering, angling or driving of attachments.

New Departure, Division of General Motors Corp., Bristol, Connecticut.

Nothing Rolls Like a Ball

NEW DEPARTURE BALL BEARINGS

158

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

White Motor Co.—Henry J. Nave has been named director of service sales and operations.

Chrysler Corp. — A. L. Meserve has been appointed superintendent of the Trenton, Mich., plant.

Baker-Raulang Co.—**G. B. Davis** has been elected vice president in charge of sales.

General Electric Co.—**W. H. Bobear** has been appointed manager of subcontracting for the Aeronautic and Ordnance Systems Dept.

Walker Manufacturing Co.—**Walter E. Shoff** has been appointed director of purchases.

Evans Products Co.—**J. W. Cheetham** has been named director of purchases.

Purolator Products, Inc.—**Donald C. Huber** has been chosen assistant advertising manager.

Admiral Die Casting Corp.—**Fred Friedlieb** has been appointed sales manager.

Armstrong Cork Co.—**Max Banzhaf** has been promoted to director of advertising and promotion.

Willard Storage Battery Co.—**Howard C. Negus** has been named merchandising manager.

Goodyear Tire & Rubber Co.—**Mark W. Laibe** has been appointed director of purchases and **Rollin D. Chittenden** purchasing agent.

Goodyear Aircraft Corp. — **R. M. Hudak** has been named factory manager.

Chrysler Corp., Export Div.—**Virgil T. Tolen** has been appointed sales distribution manager, while **Kenneth E. Thompson** has been named regional executive manager for the Central-South American Region.

Doehler-Jarvis Corp.—**F. J. Koegler** has been elected president.

Standard Products Co., Port Clinton Div.—**E. A. Norris** has been promoted to manager.

Tobey Manufacturing Corp.—**Thomas L. Runner** has been appointed sales manager.

National Motor Bearing Co., Inc.—**Hugh L. Wright** has been named personnel manager.

General Motors Diesel, Ltd.—**John W. Brophy** has been appointed acting general manager.

United Platers, Inc. — **Burton E. Drury, Jr.**, has been made sales manager.

American Machine and Foundry Co., General Products Div.—**Alfred J. Fava** has been appointed sales director, and **J. J. Cranmore** has been made manager of the Lowerator Dept.

Texas Engineering & Manufacturing Co., Inc.—**Vernon N. Ferguson** has been appointed chief industrial engineer.

Chanslor & Lyon Co.—**Roy D. Adams** has been named president and general manager.

Pacific Airmotive Corp. — **M. A. Wachter** has been appointed division manager, manufacturing, and **D. R. Wetmore** has been chosen as his assistant.

General Motors Corp., New Departure Div.—**R. E. Waldo** has been appointed general manager.

American Brake Shoe Co., American Forge Div.—**Edward R. Anderson** has been named president, succeeding **William E. Crocombe**, who has been appointed assistant to the chairman.

Aircraft Radio Corp.—**William F. Cassedy, Jr.**, has been elected president.

Crescent Co., Inc., Automotive Div. — K. R. MacLean has been chosen sales manager.

Cheffard Master Manufacturing Co. — John Waldherr, Jr., has been appointed director of engineering.

Borg-Warner Corp., Ingersoll Products Div.—**James H. Ingersoll** has been placed in charge of all contract and defense sales.

(*Turn to page* 157, *please*)

Necrology

Lewis A. Hastings, 64, advertising manager of Heald Machine Co., died Dec. 21, 1951, in Worcester, Mass.

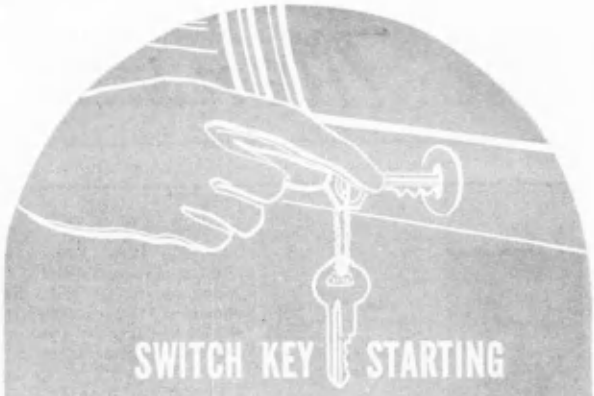
Oscar A. Knight, 72, retired Detroit district manager of the Grinding Machine Div., Norton Co., died Dec. 17, 1951, in Royal Oak, Mich.

James A. Rafferty, 65, vice president and director of Union Carbide & Carbon Corp., died Dec. 19, in Fort Lauderdale, Fla.

Dr. Fernand Turrettini, jig borer developer and head of Societe Genevoise d'Instruments de Physique, died Nov. 3, 1951, in Geneva, Switzerland.

John M. McMillin, 68, vice president and director of Cities Service Co., died Dec. 27, 1951, in New York, N. Y.

John K. Hough, 60, advertising director of Goodyear Tire & Rubber Co., died Dec. 29, in Akron, O.



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COSTS LESS

WITH **Bendix**

STARTER DRIVE

Just turn the ignition key and you're ready to go—that's the new and convenient way of starting. And best of all, switch key starting, like most starting systems, costs less with Bendix* Starter Drive. This unique combination of convenience and low cost is made possible by Bendix exclusive design features. For example, the Bendix Starter Drive requires no actuating linkage and the solenoid may be placed in any convenient position. Result—starting motor can be mounted more easily and in more positions. Also, the Bendix Drive has fewer parts and needs fewer adjustments. If you want true economy from installation to service, plus performance proven by over 85,000,000 installations, be sure to specify Bendix Starter Drives. Your inquiry will receive immediate attention.

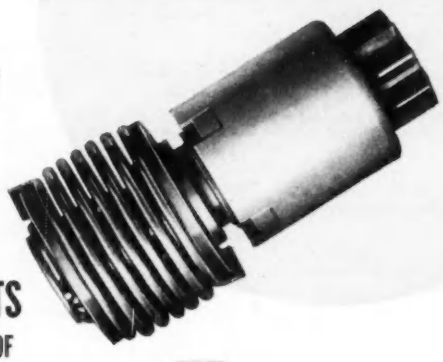
*REG. U.S. PAT. OFF.

ECLIPSE MACHINE DIVISION of

Bendix AVIATION CORPORATION

ELMIRA, NEW YORK

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.



PUSH BUTTON

FLOOR BUTTON

SPECIALISTS IN ALL TYPES OF STARTING!

ACCELERATOR

SWITCH KEY

CLUTCH PEDAL

EVEN OUR COMPETITORS' BEST CUSTOMERS INSIST ON SUNOCO WAY LUBRICANT

In the competition for industry's lubrication business, all refiners are constantly improving their products. Every so often, one company or another finds a way to make a petroleum product that, for a particular use, licks to a standstill anything its competitors can offer. Immediately the others dig in and try to find the secret. Until they succeed, the originator's ingenuity pays off in a rising flood of sales.

That is the happy position in which Sun Oil Company finds itself with its Sunoco Way Lubricant. Since its introduction eight years ago, no other refiner has been able to match this tableway lubricant. Here is proof any man in metalworking can appreciate:

Sunoco Way Lubricant is insisted upon by 188 metalworking concerns which buy all their other lubricants from our competitors.

In other words, our competitors have loyal 100% customers, just as we have; but when it comes to tableway lubrication, loyalty goes out the window and Sunoco Way Lubricant is specified.

The reason for the success of Sunoco Way Lubricant is that no one has been able to equal it for *protection of tableways . . . ability to prevent "stick-slip" . . . prevention of table flotation . . . resistance to wiping off or squeezing out under heavy loads.* These benefits add up to higher production, better finishes, lower maintenance costs, longer tool and machine life. That is why Sunoco Way Lubricant is approved or definitely recommended by 38 of America's leading machine tool builders.

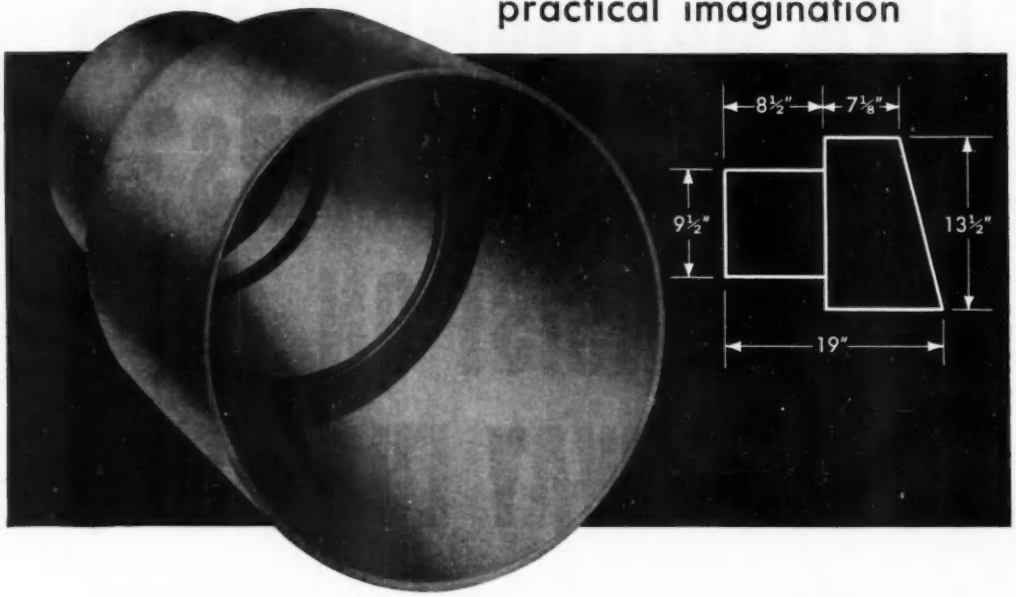
Want to see factual case histories and learn more about this product? Send for illustrated booklet, "Sunoco Way Lubricant." Samples are available, too, to companies in the metalworking industry. Write Dept. AA-1.

SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

SUNOCO®

practical imagination



"welded" assembly makes large plastic parts practical and economical

Look at this large, laminated plastic part. It is 19" long with two concentric diameters of 13½" and 9½" connected by a flat ring. Think of the cost of molds for making such a piece—and then consider the fact that only a few such parts are required. The cost would be prohibitive.

It is on problems like this that Continental-Diamond's knowledge of plastics and their fabrication pays off for you. C-D engineers took two Dilecto tubes of the required diameters and wall thicknesses and then cut a ring from a sheet of Dilecto to just fit the O.D. of the smaller tube and the I.D. of the larger.

These three parts were then literally "welded" together into a strong, low cost part. The material used to do the "welding" is one of the compounds developed by C-D in their vast experience of fabricating parts of Fibre, Vulcoid, Celoron, Micabond, Dilecto and combinations of all of them.

If you have a problem—or a standard application for plastics, it will pay you to check with your nearest C-D office.

your partner in producing better products

DILECTO (Laminated Thermosetting Plastic)
CELORON (Molded High-Strength Plastic)
DIAMOND FIBRE (Vulcanized Fibre)
VULCOID (Resin Impregnated Fibre)
MICABOND (Bonded Mica Splittings)

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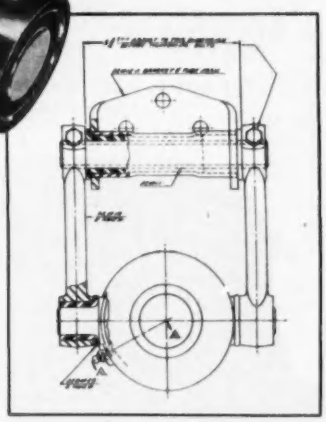
Continental-Diamond FIBRE COMPANY

Established 1895..Manufacturers of Laminated Plastics since 1911—NEWARK 2 • DELAWARE

the LONG and SHORT of it



A midshaft bearing hanger for trucks that permits standardizing on propeller shaft lengths.

THOMPSON engineering has perfected a center bearing hanger assembly that assures exceptional ease of service. The unit is completely symmetrical. Its flexibility eliminates the need for precise positioning by shims. Adjustments are eliminated because the bearing is retained by two simple snap rings.

Standard annular ball bearing has longer life and greater capacity than self-aligning type. Free swinging, the swing arms and rubber bushings eliminate cramping and thrust loading of the bearing due to frame twist and drive line movement. A combination of shaft seals and slingers provides ideal bearing operating conditions.

High frequency vibration is reduced by the use of 4 small rubber bushings widely spaced and acting in tandem instead of the conventional large mass of rubber that permits major displacement resulting in shaft shimmy. The hanger insulates the vehicle drive line from the frame, reducing the tendency to transmit noise to the vehicle cab.

Investigate this Thompson development. Let us tell you how it will cut production and distribution costs. If you have steering or chassis problems, let Thompson engineers help you solve them. Thompson Products, Inc., 7881 Conant Avenue, Detroit, Michigan. Phone: WA 1-5010

Thompson Products, Inc.

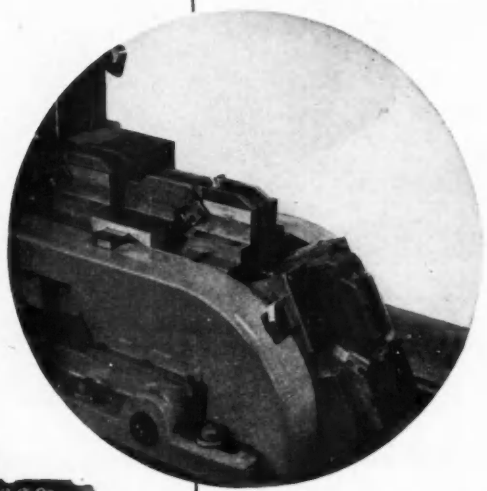
DETROIT DIVISION

Continuous

surface broaching of small parts

• In many plants where large quantities of duplicate metal parts are being machined substantial savings are being made through the adoption of surface broaching. Production is exceptionally high, close tolerances are maintained, and tool maintenance costs are much lower than with ordinary methods. Foote-Burt engineers, pioneers in this advanced machining method, have had a wide experience in applying surface broaching in many fields.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: General Motors Building



• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

FOOTBURT machine tools

. . . a time tested line of machine tools

SEALED TO ORDER BY VICTOR

Why STUDEBAKER Specifies VIC-2-FOLD Head Gaskets

How thin can a head gasket be, yet assure effective sealing of modern high compression engines?

Studebaker engineers found the answer in VIC-2-FOLD—the thinnest practical metal-asbestos construction, yet having adequate compressibility for positive sealing. On the engine, VIC-2-FOLD, as shown, compresses to 3/64" while providing maximum breakdown and corrosion resistance. Studebaker's *Commander* and *Land Cruiser* models use VIC-2-FOLD head gaskets exclusively.

The Sealing Service That Satisfies!

Wherever automotive design calls for sealing with gaskets, shaft seals, or packing, Victor is at your service. For all such applications, Victor offers the industry's foremost facilities for developing and manufacturing sealing products that assure better service and greater satisfaction.

VIC-2-FOLD

THE THIN COMPRESSIBLE METAL-ASBESTOS HEAD GASKET FOR HIGH COMPRESSION ENGINES

Compressible to 3/64" average on engine, VIC-2-FOLD is the thinnest practical encased asbestos gasket construction, utilizing the high strength of steel and the corrosion-resistance of copper. Note how steel bottom layer is formed up in combustion chamber openings, overlapping copper top layer for maximum protection against breakdowns and blowouts. Inversely, in coolant openings, copper layer is formed down to overlap steel layer, for maximum corrosion-resistance in contact with coolants and anti-freeze solutions.

More flexible than standard head gasket construction, VIC-2-FOLD sealing is equally suited and fully effective on Valve-in-head or L-head engines.

Where can we help you to better sealing?

Victor Manufacturing & Gasket Co., *and its affiliate*, Victor Sealing Products Co., Inc., P. O. Box 1333, Chicago 90, Ill.

VICTOR
GASKETS AND OIL SEALS
SEALING PRODUCTS THROUGH RESEARCH

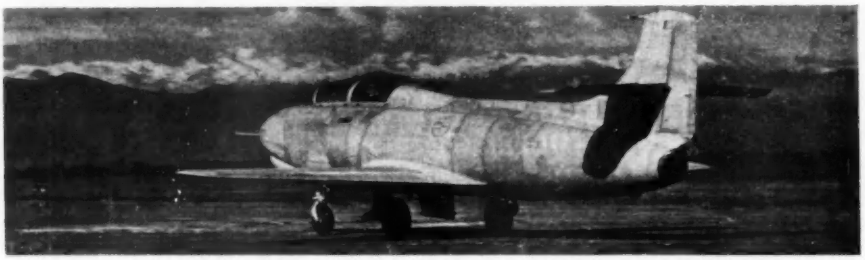
VICTOR

"ORIGINAL EQUIPMENT"

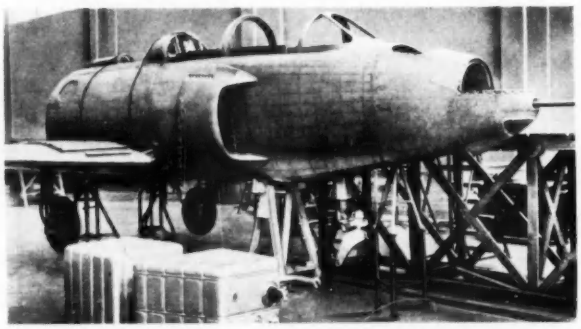
Gaskets and Oil Seals

SEALING PRODUCTS ***EXCLUSIVELY***

Fiat Jet Plane Has Top Speed of 550 MPH



Fiat G 80 plane which is powered by a Goblin 35 turbojet engine.



Fuselage of the G 80 under construction in Fiat's Aviation Division at Turin.

ITALY's first modern jet plane — the Fiat G 80 — was brought out recently by the Aviation Division of Fiat at Turin. It is an all-metal monoplane with central fuselage, two tandem seats, and retractable tricycle landing gear.

A Goblin 35 turbojet engine powers the present version of the G 80 which will be followed soon by a second version equipped with a Rolls-Royce Nene power plant of higher performance. According to Fiat's plans, a third version of the plane will be fitted with a De Havilland Ghost turbojet engine.

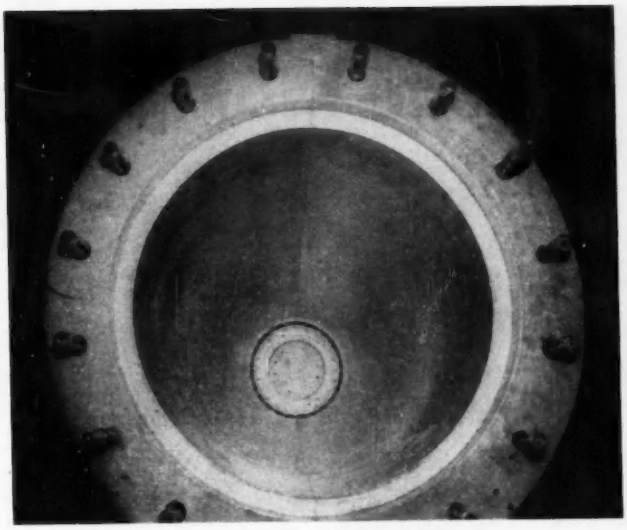
The fuselage is of monocoque construction and is divided into three portions. The first one, which contains the pilot's cabin, carries the front landing wheel and the air intakes to the engine with the boundary layer slots. The second portion, which rests on the central wing section to which the outer wings are connected, houses the main fuel tanks and carries also the jet engine. The third portion houses the exhaust pipe and carries the tail planes.

The wing assembly consists of a central portion and two swept-back outer wings. The wings are of box construction with two C-section spars and ribs. Longitudinal stringers, for stiffening the skin on the top, form part of the wing and their shape has been designed in such a way as to afford, besides a

(*Turn to page* 98, *please.*)

Condensed Specifications of the Fiat G 80 Turbojet Airplane

Static thrust at sea level	
Take-off and emergency thrust (lb)	3500 at 10,750 rpm
Maximum continuous thrust (lb)	3000 at 10,250 rpm
Maximum cruising thrust (lb)	2300 at 9,500 rpm
Dimensions	
Wing span (ft)	36
Length (ft)	40.5
Height (ft)	13
Wing surface (sq ft)	270
Aspect ratio	4.82
Weights	
Empty weight (lb)	8950
Payload (lb)	2960
Total weight (lb)	11910
Characteristic ratios	
Wing load (lb/sq ft)	44
Load per lb of thrust, emergency (lb)	3.4
Thrust-area ratio, emergency (lb/sq ft)	13
Flight characteristics calculated for a weight of 11,910 lb	
Maximum level speed at sea level (mph)	550
Normal range (miles)	970



Inside view of form die.

Fuel Tanks Formed With Hydraulic Pressure

By E. A. Schrodeck

Tooling and Planning Division, El Segundo Division Douglas Aircraft Co.

THE forming of aircraft parts is not always confined to the conventional methods. Such was the case at the El Segundo Plant of Douglas Aircraft Co., involving a fuel tank. Several of these tanks were made on an experimental basis, employing the use of spinning to obtain the desired shape. This method permitted production of satisfactory assemblies, but on a production basis was too costly. It became necessary to incorporate the thoughts and suggestions of all departments concerned, preparatory to building these tanks on a production schedule.

At the outset the Engineering Design Department established certain requirements as to size, strength, and shape. The latter, because of the tolerance required with respect to the overall contour, necessitated a new approach in a final sizing operation after welding.

To reach this state, naturally several preparatory steps and operations were required. Because of the limits already established in the stretching of the 61 SO material being used, it was necessary to preform the half sections of the tank on a drop hammer, and determine the proper trim lines prior to the welding operation so as to end up with a contoured cone-shaped section, which required approximately a six per cent elongation by stretching, to obtain the final contour desired. To accomplish this a large sizing die or cavity was made, the inside of which conformed to the loft lines of the tank itself.

This sizing die had to be made in halves and bolted together. Being an aluminum casting, certain calculations were necessary to guarantee that it would withstand at least 500 lb pressure from the inside. Initially it was felt that suitable sealing methods could be employed to permit the die itself to contain the hydraulic fluid; however, this proved impractical, so a single sheet rubber bag was draped around the mandrel and securely fastened to the removable top.

The section of the tank having been heat treated and put in the "W" condition, was then placed inside of the sizing die and the hydraulic fluid pumped in. Actual pressure required to form this particular shape developed to be around 400 lb. This pressure may vary slightly depending on the condition of the material at the time of sizing. The elapsed time element for the sizing operation itself is relatively short, approxmately three minutes, which is merely the time required to pump 25 gal of fluid into the die and out again.

Many improvements have been made on the sizing die itself to speed up the overall operation. Automatic air-operated extractors remove the formed section, quick acting locks fasten the top, and electric hoists for load and unload the combined rubber bag, steel mandrel, and top. The whole operation now only requires about five minutes to complete.

As was previously stated, the operations necessary to prepare the section for forming are extremely important, particularly the welding operation. Here an automatic welding machine was used. Normally this type of machine is designed to operate in a straight plane; however, to have this equipment function in

(*Turn to page* 108, *please*)

The Completely New LINCOLN

Overhead-Valve Engine, Chassis with Ball Joint Front Suspension and Redesigned Frame, and New Bodies Are Among the Features Introduced for 1952

By Joseph Geschelin

THAT rare experience, an opportunity to design a completely new automobile, was presented to Lincoln engineers in the development of the 1952 line. Lincoln cars are completely new throughout—new bodies, new chassis, new overhead valve engine, and a unique front suspension system differing radically from those commonly in use.

Not the least of the undoubted advantages of designing a new car is the freedom from the usual compromises imposed by existing mechanism. Thus, the new chassis could be made to accommodate the new powerplant and other features as part of a balanced program.

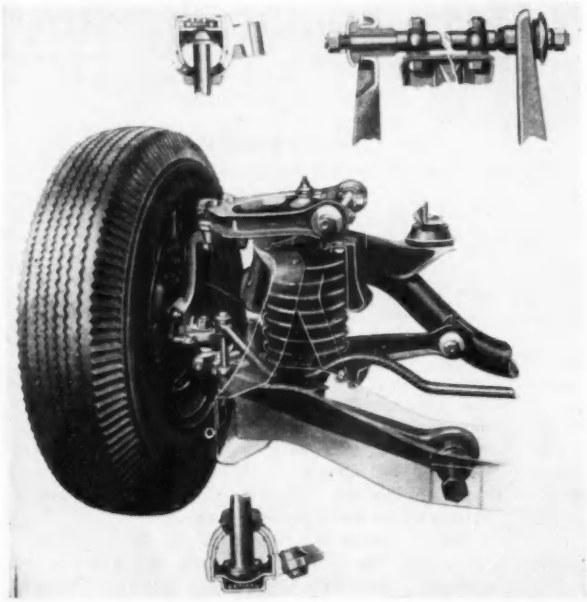
The combination of new bodies and engine has made it possible to reduce overall bumper-to-bumper length by eight in., and extreme width by one in. Wheelbase, too, has been reduced by two in., to 123 in. The new model is considerably lighter.

The line-up of body styles is as follows:

Lincoln Cosmopolitan — Sport Coupe —Hardtop body; Custom four-door Sedan—the basic sedan model.

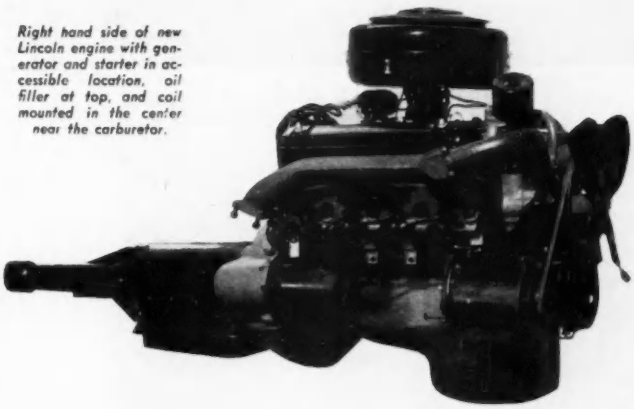
Lincoln Capri—Capri Coupe—Hardtop Styling; Special Custom Capri; Convertible with electrically-operated top mechanism; Special Custom Capri four-door Sedan.

Considering mechanical features first, the new 90 deg, V-type, overhead-valve, eight cylinder engine develops 160 hp at 3900 rpm. Although it is over 100 lb lighter than its predecessor, for reasons of flexibility of applications as

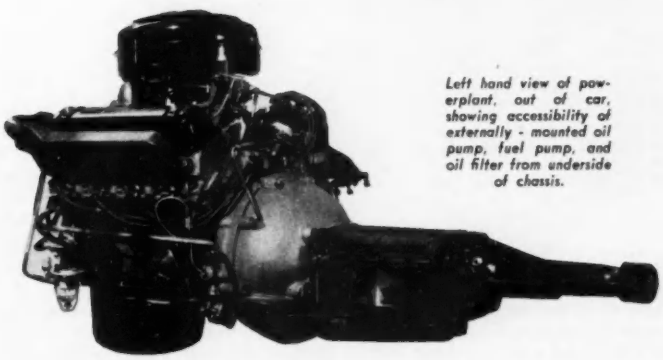


These part-phantom, part-cutaway views show details of construction of the new front suspension system. Note that the terminal ends of the upper and lower control arms are attached to the front wheel spindle by means of ball joints, with thrust taken on a ball bearing in the lower joint.

Lincoln-Cosmopolitan Custom four-door sedan.



Right hand side of new Lincoln engine with generator and starter in accessible location, oil filler at top, and coil mounted in the center near the carburetor.

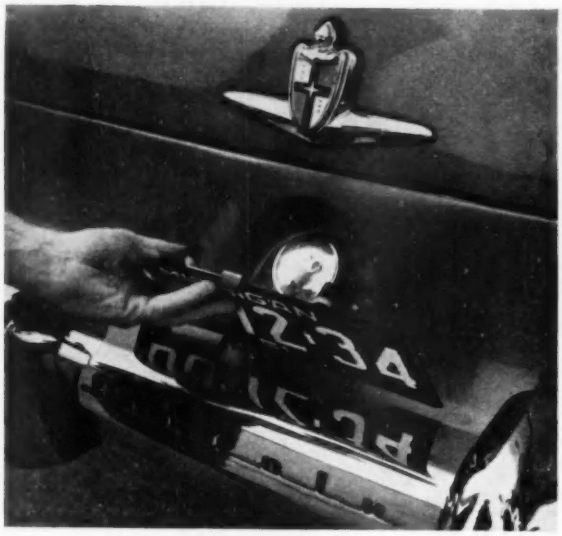


Left hand view of powerplant, out of car, showing accessibility of externally - mounted oil pump, fuel pump, and oil filter from underside of chassis.

well as the demand for ruggedness and rigidity, lightness was not a governing factor in design. The cylinder block structure is massive and heavily ribbed to provide the rigidity essential in a high compression, high output engine, considering also the possibility that increased output and higher compression ratios may be demanded of the same basic engine in the future. Cylinder heads also are massive and rigid.

The crankcase structure is deeper than customary, extending well below the main bearing center line. This permits a stiff, shallow oil pan, with a wide and continuous, flat gasket surface as an aid to positive sealing. In somewhat similar fashion the top side of cylinder heads has been modified to provide a more adequate method of oil sealing at the gasket joint. The sides of the casting have been extended to produce a panrail above the level of the rocker box floor. This results in a continuous face to which the gasket is attached above the usual pool of oil in the compartment.

With overhead valve design, the engine features larger diameter valves. However, this is accompanied by several unusual features. In the first place, Lincoln has discarded conventional valve guides, the valve stems being guided in bores directly in the parent metal of the head. This lowers exhaust valve temperature by 100-125 F. To take care of normal wear of mating surfaces, Lincoln will have available valves with two oversizes on the valve stem. In addition, all intake and exhaust valves are fitted with a unique



Fuel filler is recessed in the panel under the desk lid as shown. Normally it is hidden from view by the swinging license plate holder.

Unique features of the new Holley carburetor are seen in this phantom view. The big hat-type oil bath air cleaner fits over the entire upper portion of the carburetor, pilots on the large diameter flange.

Lincoln V-8 Engine Condensed Specifications

Type	90 deg V
No. cyl	8
Bore (in.)	3.8
Stroke (in.)	3.5
Displacement (cu in.)	317.5
Compression ratio	7.5 to 1
Bhp (max)	160 @ 3900 rpm
Torque (lb ft) (max)	284 @ 1800 rpm
No. main bearings	5
Weight, dry (lb) (with all standard accessories less clutch housing)	711

type valve rotator, made by Lincoln. Johnson hydraulic valve lifters have been adopted this year.

The piston and ring setup follows the same pattern as on the former engine. Connecting rods, however, are of a new I-beam section design, stemming from stress analysis studies, to achieve rigidity and durability. To this end the outer web is continued right into the edges of the big end, with a counterbore eccentric with the bolt hole. Heads of bolts are specially formed to fit the counterbore and, consequently, are self-locking.

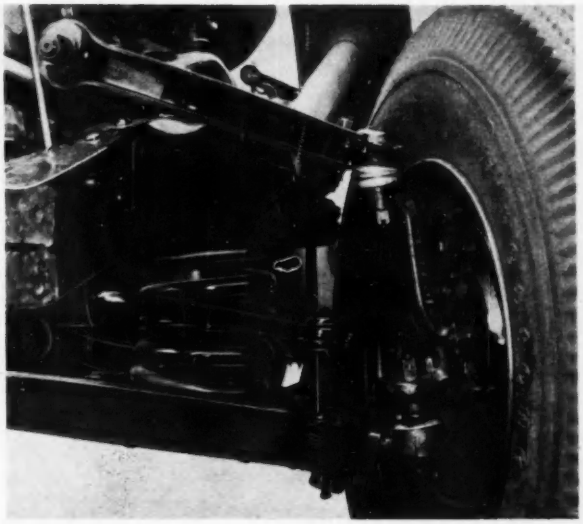
Distributor drive now is positive, driving directly from the gear cut on the camshaft. The oil pump is then driven through an intermediate shaft and a tongue and fork drive at each end. It is of interest, too, that the oil pump is mounted outside the oil pan on the left side of the engine. A full flow oil filter, mounted horizontally outside the crankcase on the left, is fitted at the factory.

The new engine has a short, stiff, counterweighted five-bearing crankshaft with connecting rods mounted side-by-side on the pins. The vibration damper is new, of the simple rubber-bounded flywheel type. As a matter of fact, this engine has such low amplitude torsional vibration as to make a damper almost a luxury.

Lincoln now employs a silent timing chain camshaft drive. The water pump is mounted integrally with the block.

Being a high compression ratio engine, with an initial compression ratio of 7.5 to 1, the Lincoln engine will be timed for optimum operation on "premium" fuel. However, with minor adjustment, it can operate on "regular" fuel with slight sacrifice in performance. The engine features a special high turbulence combustion chamber, which, in combination with mechanical octane improvement features, is expected to produce superior performance and increased fuel economy.

One of the exceptional accessory features on this engine is a radically different type of carburetor supplied by Holley for this application. It is uniquely adaptable to an overhead valve V-8 where low hood height is desired, since the hat-type oil bath air cleaner



Close-up of new front-suspension system. The enormous widespread lower control arm may be seen partially. The rear mounting of the lower control arm on the tubular cross-member also is in view. In the foreground may be seen the new link type sway bar attachment. To the rear is a partial detail of the doughnut shaped form of the boxed side rail, serving to house the upper end of the coil spring.

is mushroomed over the carburetor and serves as the outer housing for the carburetor, as illustrated. It is a dual carburetor of concentric bowl type with the entire metering system at the center line of the fuel bowl.

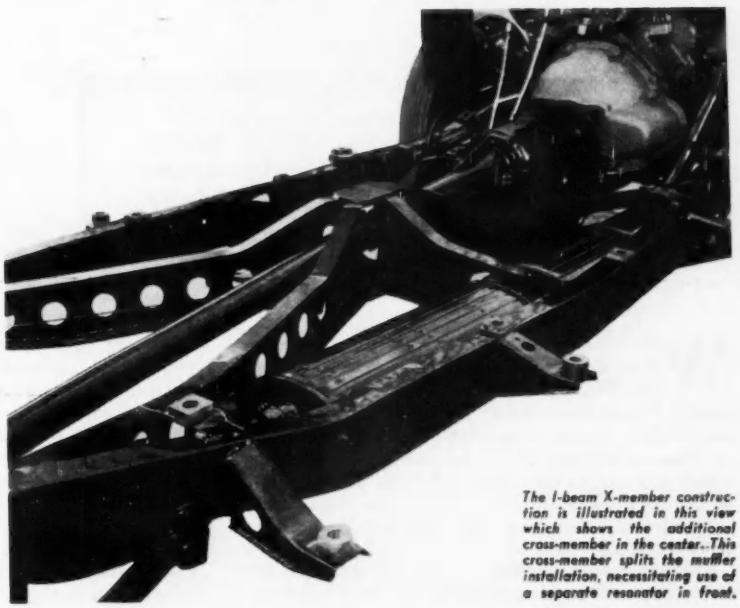
Among its principal features are: Diaphragm type economizer; insulated fuel bowl; fuel metering system unaffected by angularity; balanced pressure is from the air stream rather than the atmosphere, hence unaffected by air cleaner condition. In addition, the fast idle cam is built-in and is actuated by the automatic choke. Incidentally, on this engine automatic choke operation is controlled by manifold temperature rather than under-hood temperature and, consequently, is responsive to engine temperature changes alone.

A noteworthy feature of this engine is that selective fits will be used exclusively in the installation of valves, pistons and rings, piston pins, and main and connecting rod bearings. Taking advantage of advanced production equipment and the latest types of precision gaging devices, Lincoln finds it both feasible and economical to make selective assemblies.

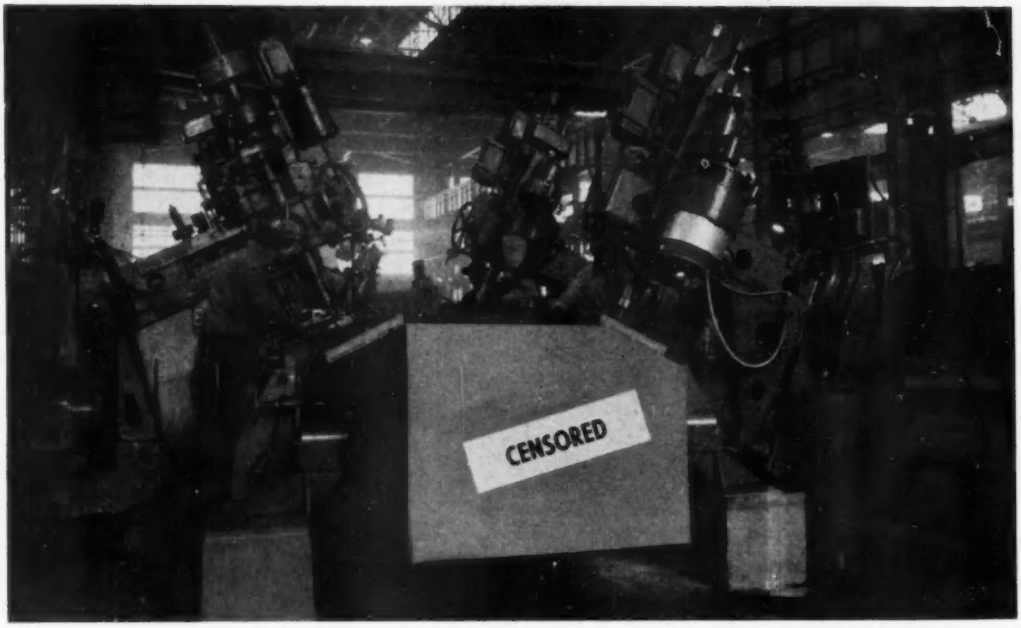
Incident to the introduction of the new engine, heat rejection has been materially reduced, making possible the use of a smaller radiator and smaller capacity cooling system. In fact, cooling system capacity has been reduced from the previous 34½ qt. to but 24½ qt.

The chassis frame is entirely new, with an I-beam section X-member and five cross members. A unique feature is that one of the cross-members is fitted at the center of the X-member, thus making for maximum bearer stiffness as well as torsional rigidity. Another innovation is found in the discarding of the

(*Turn to page* 102, *please*)



The I-beam X-member construction is illustrated in this view which shows the additional cross-member in the center. This cross-member splits the muffler installation, necessitating use of a separate resonator in front.



This is one of the few special-purpose tool setups used in hull production. In this view, only four of the six drill heads are in operation drilling some 140 holes in the slope sheets.

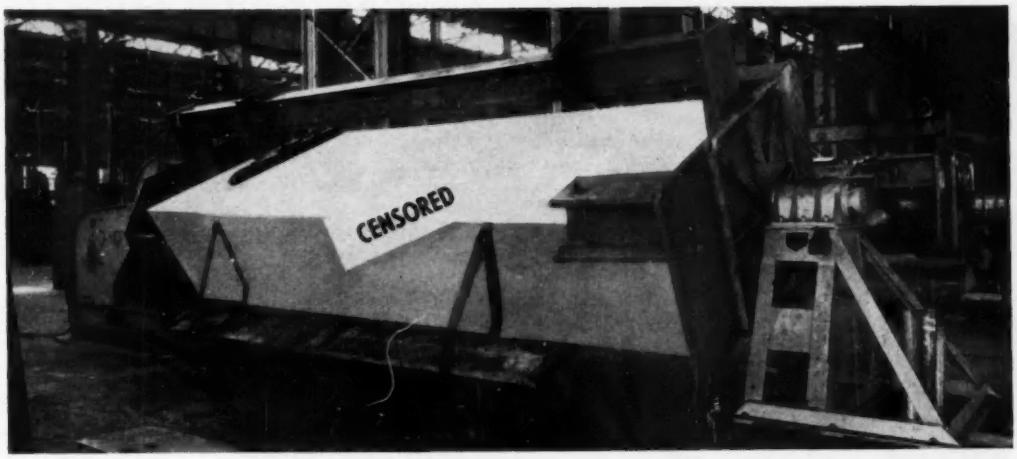
Tank Hull Output New

This Article Has Been Cleared by the Military Security Branch of the Department of Defense. In the illustrations, Tank Hulls Have Been Obscured for Security Reasons to Eliminate Secret Details of Design.

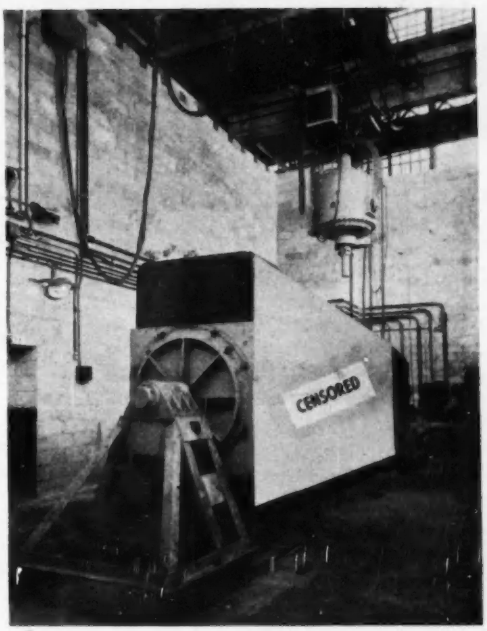
WITH the utilization of modern production equipment and processes, the Eddystone plant of the Baldwin-Lima-Hamilton Corp. is mass manufacturing tank hulls. In production just one month after the plant was offered to the Government for defense production, hulls have been turned out at a high rate for the past few months and output is expected to be doubled by the middle of this year. Considerably over 100 tank hulls are continually in process along the production line.

The anticipated increase in production is due to several new developments which have recently been brought to light by Baldwin engineers. Naturally, research is constantly being carried on for methods, materials, and machinery that will aid in faster and more economical production. Some of the new developments already are in use while others are being applied just as rapidly as possible.

While a few of the new production practices can be mentioned here, others are still in the security stage. A welding process for minimizing locked-in stresses which has been given approval by the Army, two burning operations on the slope plates, a special setup for one of the machining operations on the turret ring, a



When the hull is tack welded and checked for dimensional accuracy, it is placed in a welding positioner, such as the one shown, for final exterior welding.



One of the most recent acquisitions of the tank plant is the million volt X-ray room for the inspection of welds. The hull is lowered into the room by means of an overhead crane.

Upped By Techniques

By Thomas Mac New

high-powered X-ray room, and a special line for washing and painting are some of the items which have been or are about to be installed on the production floor.

Most of the machines used for production of this type are general purpose tools. Baldwin obtained most of its tooling from Government surplus stocks while other machines were transferred from locomotive production operations. In many instances Government tooling had to be rebuilt for the operations required. Practically all of the special welding positioners, jigs and fixtures required for the program were made by the company. All of the weldments on the tank hull are butt joints with the weld metal being deposited by electric arc. Actually, more than a ½ mile of welding rod weighing about 800 lb is used for each tank. Electrode sizes range from ⅛ to 5/16 in.

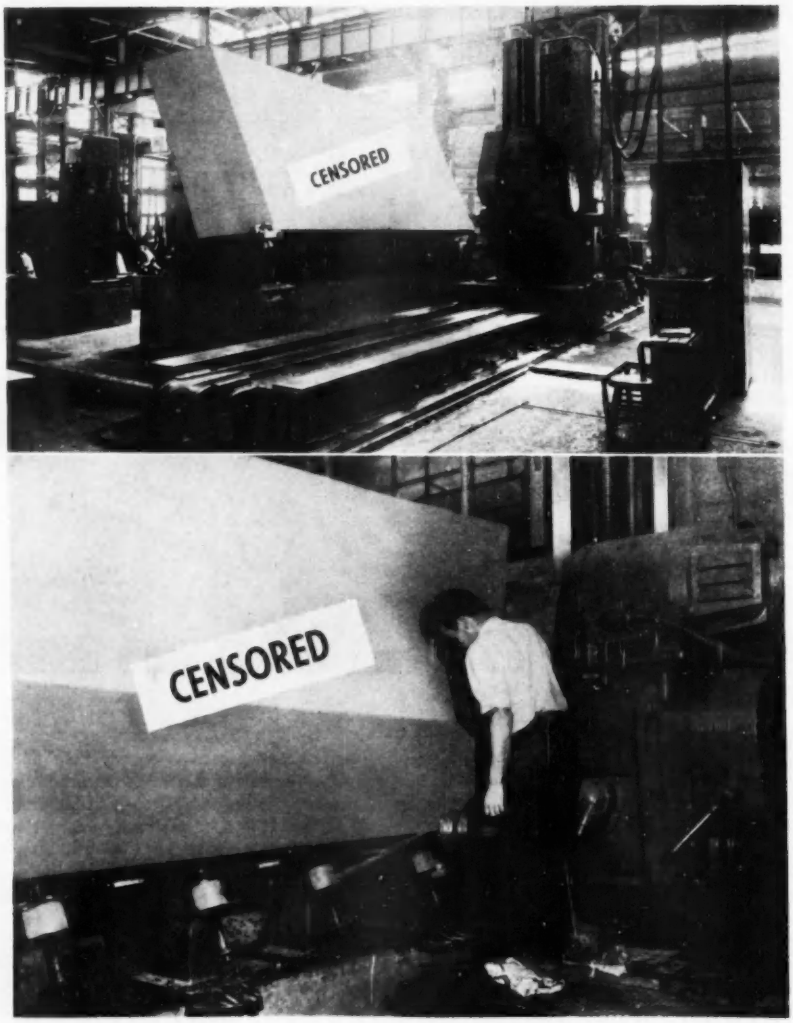
One of the first operations on the main tank hull—which consists of eight heavy steel and armor plate members and eight steel castings—is the welding of the sides. The plates which make up each side are held in a special fixture to prevent distortion while being welded along the 39-in. seam. It takes about 14 man hr to process each side. *(Turn, please)*

When the side is welded, it is conveyed to an Ingersoll horizontal milling machine where the top edge is milled along a 60-in. long surface. With a speed of 125 rpm and a feed of five ipm, a carbide milling cutter has to cut through one weld besides the armor plate. In the various machining phases, cutting tools very often have to cut through two or more dissimilar metals. This has presented some problems in respect to the selection and proper grind of tools. Even yet, tool engineers are working on tools which will operate still more satisfactorily on the dissimilar metals encountered.

Various holes are then drilled in a portion of the side plate. Carlton radial drills with a six-ft span are used for the operation. These holes are drilled at a speed ranging from 47 to 125 rpm with a feed from 0.004 to 0.012 ipr. About 14 man hr are required for the machining.

While the side pieces are being processed there are of course other operations carried out simultaneously. The rear and side guard ring castings are placed in Niles vertical mills for the milling of the top face and two pads. Floor plates are welded together to form a sub-assembly. Armor for the floor plates varies in thickness; it takes about 56 man hr to complete the floor assembly.

All of the materials necessary for the exterior shell are then conveyed to a special Baldwin-built assembly fixture. Here two rear guard rings, two side guard rings, a front hull casting, a rear hull casting, two side plates, and the floor plate sub-assembly are placed in the fixture with the necessary stiffeners and strong-



These views show the milling operation on the slope plates. This is the second major machining operation on the hull. Plates are faced for assembly of the suspension brackets to the slope sheets.

A horizontal boring mill is used for boring the transmission hole. This hole, along with a mounting pad, is also faced.

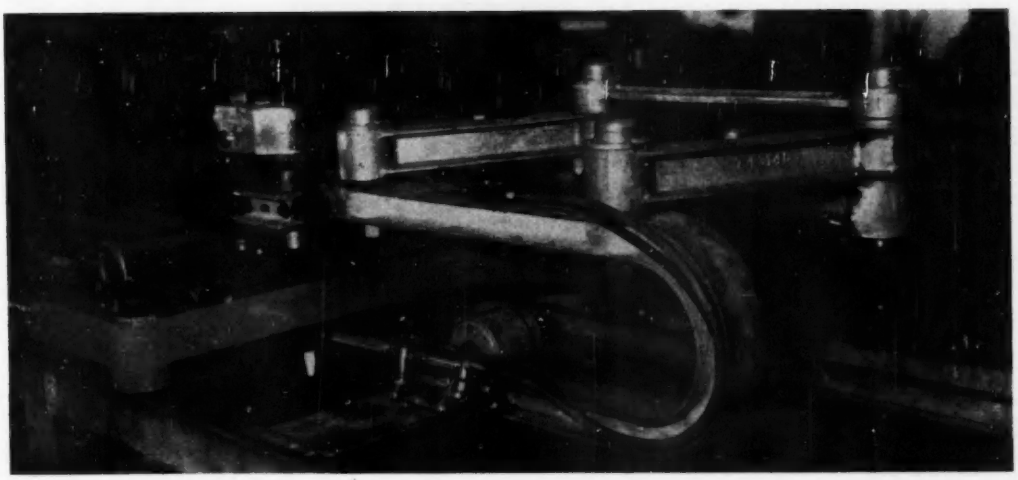
backs. This entire shell assembly is then tack welded.

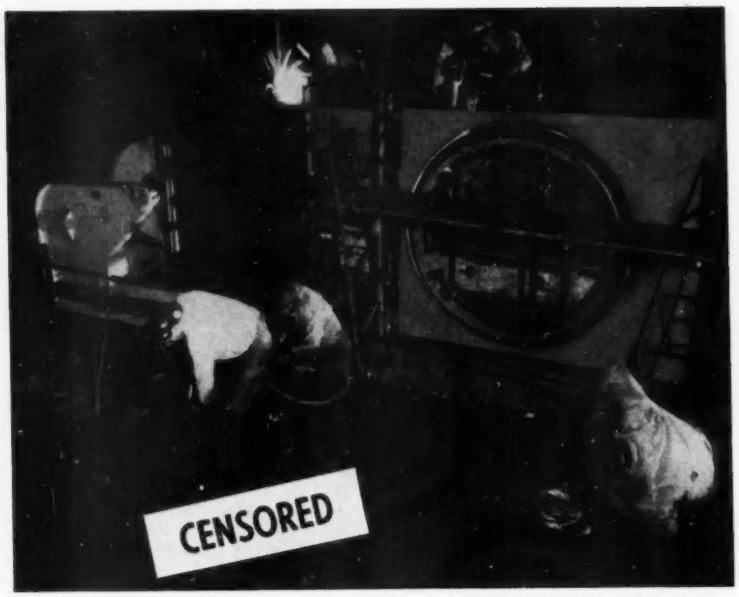
Proceeding from the assembly fixture, the hull is given a thorough dimensional check before the final welding operations are carried out. Each department has both company and Government inspectors and both inspectors must pass on the tank before it may progress along the line.

When the dimensions are assured, the hull is placed in a rotating welding positioner so that all welding can be done in the down position. Each hull spends 290 man hr in the positioner before being carried by one of the overhead cranes to the next work area.

Hulls are next laid out for machining and burning operations. Burning is performed on the slope sheets to cut out openings for suspension brackets, torsion bar clearance, and an escape hatch. With the new mechanical setup recently put in use for cutting out the suspension bracket openings, the firm has been able to save about 70 per cent in time over the old method of hand burning. For the torsion bar cutouts, an air cylinder piston-rod is connected to the cutting torch. The torch is fastened to a mechanism which controls its motion and relation to the arc desired in the slope plate, as shown in the illustration. Over five hr on each tank hull are saved with the new device over the old method of hand guiding the cutting

Approximately 70 per cent in time was saved when this device was employed for cutting out holes in the slope sheets for the suspension brackets.





After the hull assembly is tack welded it is placed in a welding positioner, background, for the final exterior welding. In the foreground, a semi-finished hull is undergoing chipping operations on the welds.

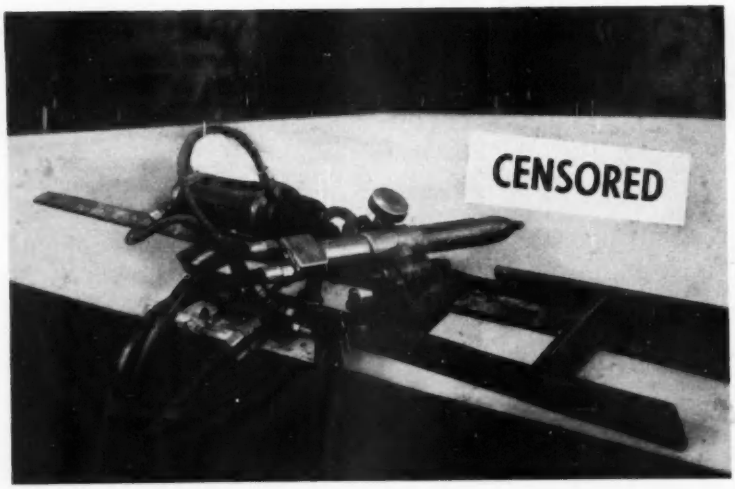
torch and grinding.

At this point, the exterior shell is put through several machining operations — six work stations are used in this phase. The idler and transmission holes are bored and faced on Ingersoll or Giddings and Lewis horizontal milling and boring machines at the first station. A pad located aft of the transmission bore is also faced at this station. Horizontal milling machines are also used at station number two for the face milling of the slope plates. Station three contains a unique Baldwin-made setup for drilling 140 holes in the slope sheets. Consisting of six drill heads assembled to a fixture, it is one of the few special purpose tools used in the plant for tank construction.

Operations at the next three stations consist of milling the escape hatch on a horizontal mill, drilling 20 holes in the engine compartment with a radial drill, and drilling and counterboring 14 holes at the external transmission mounting with a two station horizontal drill.

The semi-finished hull assembly is then placed in the final assembly line for the installation of various exterior and interior component parts. Special locating fixtures are employed for the positioning and welding of the units. These parts include the outrigger brackets, headlamp brackets, engine mounting, reinforcing ribs, brake pedal brackets, bulkhead, etc.

The assembly then goes through two final machining operations. The entire hull is placed in a special fixture for the machining of the turret ring lip which is done on a Niles vertical boring mill. Since handling and welding can cause distortion of the ring, it was decided to do the final machining after all welding and most of the machining (*Continued page* 112)



Illustrated is the torch arrangement used to cut the torsion bar clearance cutouts. This unique setup saved a great deal of time in comparison with the previously used technique.

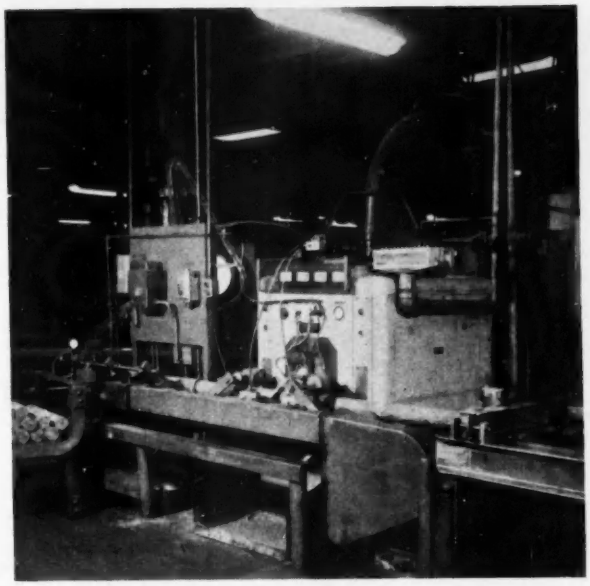
Fast Economical Descaling

by use of

Induction Heat

By Homer Kincaid

Asst. Wks. Metallurgist
Farmall Wks., International Harvester Co.



Arrangement of equipment for the production descaling operation

THE removal of surface scale from metal parts after heat treatment has always presented a problem to manufacturing. Conventional methods such as sand blasting, shot blasting and tumbling mills are most commonly used. Where heavy bars require cleaning these methods are costly because of handling and maintenance of equipment.

The requirement to clean a great volume of regular shaped bar stock prompted International Harvester to investigate cleaning by induction heat.

The theory of removing scale by induction heat is to raise the temperature of the surface scale rapidly enough to cause expansion to a degree where it will separate from the cooler base metal. This condition, together with the progressive heating of the surface scale and the irregular electrical characteristics, breaks it into small pieces as it separates from the base metal.

Tests were run at Farmall Works, International Harvester, on heat-treated bar stock of 2¾ in. diameter and 3⅛ in. diameter by 39 in. in length. After considerable experimentation it was found that by passing the bars progressively through an inductor ½ in. in width, connected to a source of 9600 cycle current, the scale could be removed. A power input of 15 to 25 kw per sq in. of surface area gave the best results. The speed of travel was set to obtain a surface temperature of approximately 350 F at the inductor.

The use of induction heat presents somewhat of a problem due to magnetic attraction of the scale particles to the inductor. This scale will form a ring around the side of the inductor where the work leaves. Fortunately, the ring builds up only to about ¾ in. in depth then will flow almost like water to a suitable container below the inductor. Tests have been made with various types of insulation but in order to utilize the greatest clearance between inductor and the bar it has been found very satisfactory to insulate only at the junction of leads and the single turn coil. High temperature refractory cement applied wet has worked out very well as an insulator. The scale does not short or arc on any other part of the inductor. The magnetic attraction does not play much of a role in descaling.

It was found that moisture is a factor in removing scale by induction heat. In the production heat treatment of the bars to be descaled there is a water spray quench following the tempering heat. This operation precedes the descaling process by about fifteen minutes. It has been noted that the descaling is more complete under these conditions and the scale tends to "pop" off the surface in a much more lively manner than on bars that are thoroughly dry.

(*Turn to page* 98, *please*)

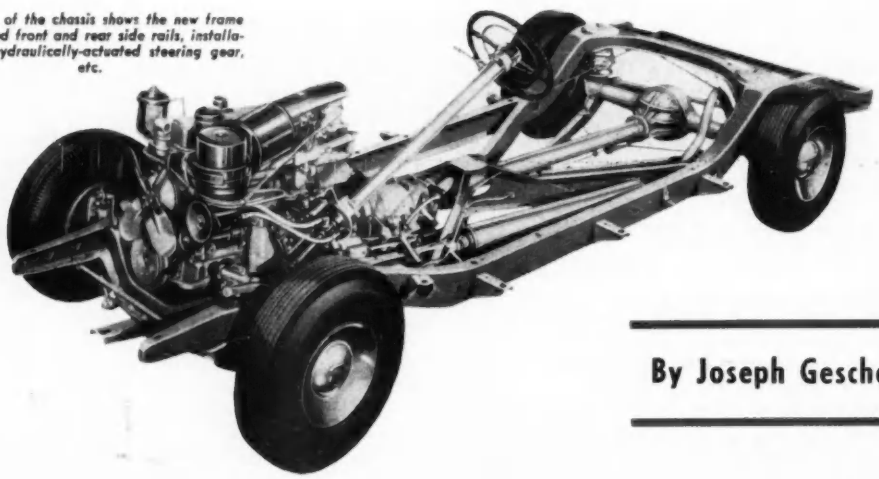
Roadmaster Riviera sedan. New exterior molding treatment and a higher trunk lid are among the styling changes for 1952.

New Buick Features for 1952

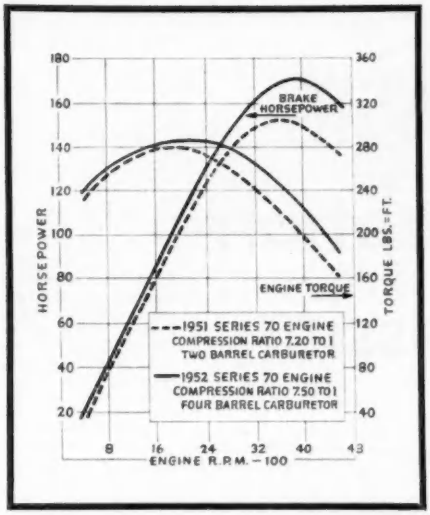
LEADING the gamut of improvements in the 1952 Buick line are two major mechanical features in the Roadmaster models, designed to further increase owner acceptance of the big car in the Buick stable. One of these is the adoption of a unique four-barrel carburetor which, together with other changes, aids in lifting engine power output to 170 bhp (max.). The other, of noteworthy importance, is the introduction of power steering as an extra cost option.

Many changes have been made in exterior molding treatment and decoration; and interior treatment and upholstery have been improved. Noteworthy is the change in the trunk lid stamping for Series 50 and 70 cars. Highly arched at the rear, it provides even

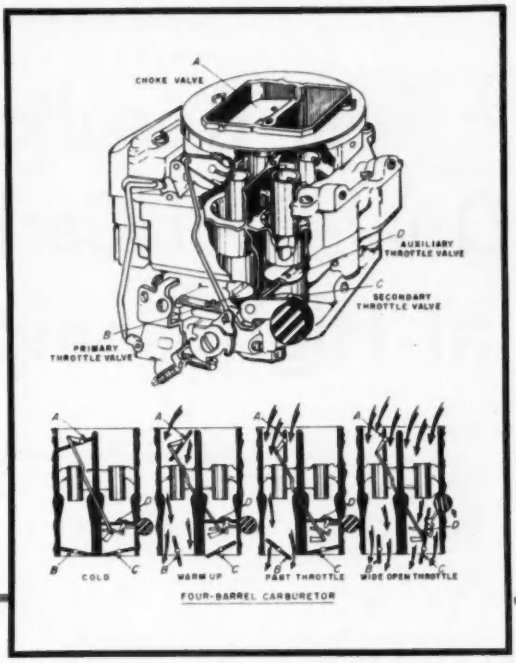
This view of the chassis shows the new frame with boxed front and rear side rails, installation of hydraulically-actuated steering gear, etc.



By Joseph Geschelin



Torque and horsepower curves of 1951 and 1952 Buick Series 70 engines.



Part-cutaway and schematic illustrations of the four-barrel carburetor. Operation of the choke and throttles is described in the text.

more luggage space and tends to balance the sweep of contour from the front of the hood to the rear.

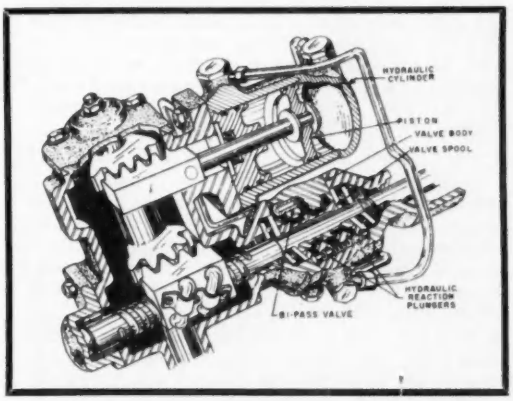
Touching on changes and improvements of general interest, still further reduction in noise has been effected by the introduction of new chassis frames with boxed front and rear side rails, and by improvements in body mountings. Besides removing certain body mounts, each body style has been given individual treatment of body mounting. The combination of individualized body mounts and stiffer frame produces a noticeable improvement in quietness. In addition, Roadmaster models have been given increased underhood insulation, and a thicker mat on the dash. On all models sound deadener is applied on doors, deck lid, seat pans and seat frames, and parts of the floor. Sound deadener also is sprayed on rear quarter panels and the under side of rear wheelhouses.

Wider front brake linings are specified for Series 40 and 50 models; wider and thicker for Series 70, all brake linings being fully riveted to the shoes. Front brake linings on Series 40 and 50 are 2.25 in. wide,, one-half in. wider than previously. On Series 70, front brake linings are 2.50 in. wide and the thickness has been increased to 0.25 in. Brake drums are correspondingly wider and have a thicker flange to prevent distortion.

As mentioned earlier the Roadmaster engine now has an output of 170 bhp (max.) with a compression ratio of 7.5 to 1. Apart from the increase in compression ratio, increased output is attributed to the adoption of the four-barrel carburetor, designed to deliver a greater volume of fuel mixture at high speeds. It is used in conjunction with new intake and exhaust manifolds.

Modeled after the concentric bowl type carburetor, the new carburetor, designed by Buick and supplied by both Stromberg and Carter, may be considered as a

(*Turn to page* 94, *please*)



Arrangement of parts in the hydraulically-actuated steering gear. Design and operation of this unit are described in a separate article.

Test Results With Dual-Fuel Carburetion at High Compression

By J. C. Porter, A. P. McCloud, and Richard Wiebe

Northern Regional Research Laboratory, U. S. Department of Agriculture, Peoria, Ill.

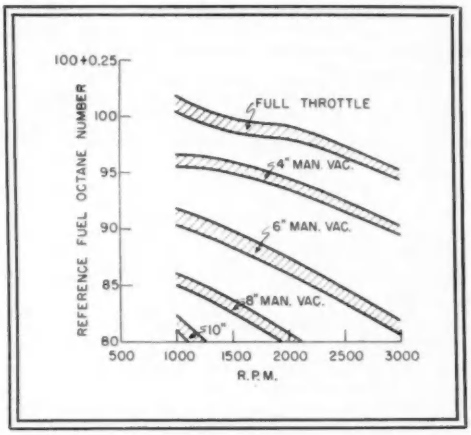


Fig. 1—Road octane requirements of General Motors Research high compression test engine with 10:1 compression ratio. Initial spark advance 2½ deg btdc. Carbon miles 10,000. Automatic distributor used—X-20239.

FOLLOWING the recent development of a more efficient experimental dual-fuel carburetor by the Carter Carburetor Corp., built especially for the GMC high compression test engine, a study of the combination was conducted by the Motor Fuels Evaluation Division of the Northern Regional Research Laboratory. Results obtained both on the dynamometer and in road tests are presented in this article.

In 1948, W. M. Holaday discussed the problem of dual-fuel carburetion (Bibliog. 1), but the carburetor used at that time was still in the initial stage of development, and the present results will give a more adequate picture of the potentialities of such a device. Dual-fuel carburetion takes advantage of the fact that passenger car engines require the full octane value of the fuel only near or at full throttle, namely during acceleration, hill climbing, and other operations requiring more nearly full engine torque. If it is feasible, therefore, to utilize the high octane component in high compression engines only when needed, not only will a considerable saving of very high octane fuel be effected but also operation of high compression engines on fuels available at the present time may be a distinct possibility.

The egeneral performance characteristics of the GMC high compression test engine at 8 to 1, 10 to 1, and 12 to 1 compression ratios have been published by M. M. Roensch and J. C. Hughes (Bibliog. 2). Their results show the real advantages which can be obtained with this engine. For the present work the 10 to 1 ratio was adopted since it appeared to be the highest practicable compression ratio for spark ignition engines reachable within the next few years.

Figure 1 shows that the maximum octane requirement of the GMC test engine at 10:1 is slightly above 100 or equivalent to approximately iso-octane × 0.1 ml TEL/gal. It also indicates that commercial premium gasolines would not satisfy the octane requirement at six in. of vacuum or lower; the practical limit for most commercial premium fuels tested was found to be from six in. to 7½ in. The high speed octane requirement of engines must be satisfied by the Motor octane number of the fuel, which in present commercial fuels is usually from six to eight units lower than the corresponding Research number. In this article the term "high octane" (H.O.) will be used to denote fuels of 100 octane or above (special hydrocarbon fuels, premium gasolines blended with alcohol, or straight alcohols) which satisfied the maximum requirement while present-day best grade premium gasolines of approximately 90 Research number are the "low octane" fuels (L.O.).

The octane requirement as a function of speed and

Table 1

Part Throttle Road Octane Ratings and Other Properties of Fuels Used as Low Octane Fuel with the Dual-Fuel Carburetor. Also Octane Requirement at Various Manifold Vacuums.

Fuel	Laboratory Rating		Part Throttle Road Rating at 6"-8" Manifold Vacuum in 10:1 Compression Ratio General Motors Research Test Engine					Reid Vapor Pressure	TEL Ml./Gal.	Specific Gravity at 60 F.
	Research Method	Motor Method	1000 rpm	1500 rpm	2000 rpm	2500 rpm	3000 rpm			
Premium "A"	92.0	87.7	91	91	90	90	90	8.1	0.94	0.706
Premium "B"	89.2	82.0	88	88	88	87	86½	12.0	2.96	0.720
Premium "X"	93.1	84.9	91	90½	89½	88	88	9.1	2.22	0.715
Octane requirement 6 in. Hg. manifold vacuum with initial spark advance at 2½ deg. BTDC	.....	.....	90½ to 92	88½ to 90	86 to 87½	83½ to 85	80½ to 82	.....	.....	.....
7½ in. Hg. manifold	.....	.....	86½ to 87½	84½ to 85½	82 to 83	.....	.....	.....	.....	.....

Table 2

Full Throttle Road Octane Ratings and Other Properties of Fuels Used as High Octane Fuel with the Dual-Fuel Carburetor. Also Full Throttle Octane Requirement.

Fuel, Percent by Volume	Laboratory Research and Motor Method Octane Rating	Full Throttle Road Rating in 10:1 Compression Ratio. General Motors Research High Compression Test Engine					Reid Vapor Pressure	TEL Ml./Gal.	Specific Gravity at 60 F.
		1000 rpm	1500 rpm	2000 rpm	2500 rpm	3000 rpm			
100% Isooctane	100/100	100	100	100	100	100	1.80	none	0.690
100% Super X	98.1/89.3	100+0.05	99½	99	97½	96½	4.25	2.98	0.736
100% Ethanol	100+0.40/91	100+1.0	100+0.05	100+0.1	100	97½	2.36	none	0.794
100% Methanol	100+0.70/90	100+1.2	100+0.7	100+0.25	100	97½	4.45	none	0.796
80% Premium A 20% Ethanol	100+0.05/90	100+0.2	100+	99½	97½	95½	6.39	0.77	0.722
77½% Premium X 22½% Ethanol	99.6/85.6	100+0.25	100	99	97	94½	9.35	1.71	0.732
Full throttle octane requirement with initial spark advance at 2½ deg. BTDC	.....	100 to 100+0.10	99 to 100	98 to 99½	96½ to 97½	94½ to 95½	.....	.....	.....

manifold vacuum varied slightly with atmospheric conditions and carbon miles but remained within two octane numbers throughout the test.

The new Carter dual-fuel carburetor (Carter EX-104-66) operates as follows: Fuel flow is regulated by two float circuits (one H.O. fuel and one L.O. fuel); one low speed circuit (L.O. fuel); two high-speed circuits (one H.O. fuel and one L.O. fuel); one pump circuit (H.O. fuel); and one choke circuit.

Fuel is metered in the high speed circuits by four metering rods (two high octane and two low octane). All four metering rods move either up or down at the same time (see Fig. 2). The flats on the rods are so positioned that the flow of fuel to the nozzles is limited to one pair at a time, except at the adjustable part throttle blending point which is of a limited duration, but can be made of a long duration.

Throttle connector rods connect the metering rods to the fuel selector plate. In normal operation the position of the fuel selector plate (Fig. 3) will be determined by the position of the throttle pin attached to the throttle shaft and the position of the fuel adjusting finger. When the throttle is opened to the point where the throttle pin exerts downward pressure on the adjusting finger, the position of the fuel selector plate will be shifted and the high octane, high speed nozzles will start to flow. The low octane, high speed nozzles will cease operating at this point.

The vacuum diaphragm assembly located on the outside of the carburetor is used to shift the fuel selector plate into the high octane full power position at any time that the intake manifold vacuum drops below six in. Hg. (adjusted to come in at 7-7½ in. Hg. for some of the tests). Accelerating pump fuel is supplied from the high octane bowl.

The vacuum created in the manifold for any throttle valve position (relation of throttle pin to fuel adjusting finger) will increase as engine speed increases. This is an inherent characteristic of any throttled spark ignition piston engine. Therefore, if fuel change-over is made by throttle pin exerting pressure on fuel adjusting finger the change-over from L.O. to H.O. will occur at increasing higher manifold vacuums with increased speed. At the same time, however, the octane requirement of the engine will decrease with increased speed. Since the part throttle road octane ratings of the premium gasolines used did not decrease with increased speed as much as did the engine's octane requirement (see Fig. 1) it was only necessary to use the vacuum diaphragm assembly to cause fuel change-over. As shown in Fig. 4 the use of throttle pin and fuel adjusting finger would cause greater consumption of H.O. fuel in the high speed, high manifold vacuum range where it is not required. For this reason the fuel adjusting finger was not used and the vacuum diaphragm assembly was made to control the fuel change-over.

The manifold vacuum at which fuel change-over from L.O. to H.O. is made must depend upon the low-

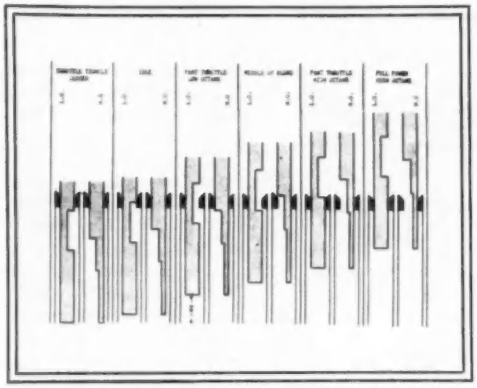


Fig. 2—This schematic illustration shows one each, high and low octane metering rods and metering rod jets of the Carter dual-fuel carburetor in their relative positions.

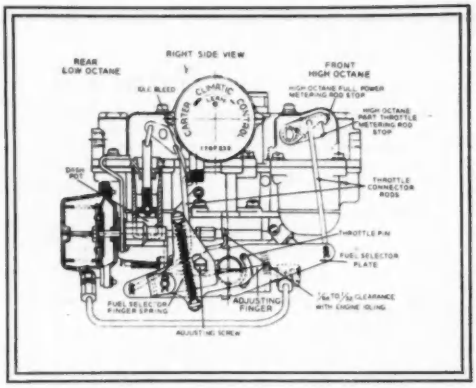


Fig. 3—Carter EX104-66 dual-fuel carburetor.

Table 3

Road and Laboratory Octane Ratings of Various Ethanol-Gasoline Blends

Fuel Blend, Percent by Volume	Research Method Octane	Motor Method Octane	Borderline Ratings Using 10:1 Compression Ratio. General Motors Research Test Engine in "98" Oldsmobile				
			1000	1500	2000	2500	3000
100% Premium X	93.1	84.8	91*	90½*	89½*	88*	88*
85% Premium X	.....	.....	99	98½	97	95½	93
15% Ethanol							
77½% Premium X	99.6	85.6	100+0.25	100	99	97	94½
22½% Ethanol							
70% Premium X	.....	.....	100+0.40	100+0.10	99	97½	94½
30% Ethanol							
100% Premium A	92.0	87.7	91*	91*	90*	90*	90*
90% Premium A	100+0.05	90	100+0.20	100	99½	97½	95½
20% Ethanol							
100% Premium B	89.2	82.0	88*	88*	88*	87*	86½*
70% Premium B	99.1	84.4	100+0.25	99	97½	95½	92½
30% Ethanol							
100% C†	86.2	76.4					
90% C + 10% Ethanol	91.1	81.0	93.5	93.0	92.5	90.5	86.0
75% C + 25% Ethanol	98.3	81.7	98.0	97.0	96.2	94.0	90.5

* Part throttle rating at 6 in. Hg. manifold vacuum.
† C = 63% catalytically cracked + 7% polymer + 30% thermally cracked + 1 cc TEL/Gal.

Table 4

Properties of Various Fuels

Fuel	Chemical Symbol	Molecular Weight	Pounds-Air per Pound Fuel for Chemically Correct Reaction	Lower Heat of Combustion Btu/lb at 77 F. Const. Vol. (In Gaseous state)	Density, lb/gal at 77 / 39 Liquid	Lower Heat of Combustion Btu/gal at 77 F. Const. Vol. (In Gaseous state)	Heat of Vaporization at 77 F. Btu/lb	Reid Vapor Pressure at 100 F. psi
Gasoline	.....	.....	15.1	19,000	6.00	114,000	130	9.5-13.5
20% Ethanol								
80% Gasoline (blend by volume)	.....	.....	13.9	17,480	6.03	105,400	188	9.5-16.0
Ethanol	C_2H_6O	46.06	8.99	11,980	6.53	78,230	396	2.8
Methanol	CH_4O	32.04	6.46	9,120	6.56	59,740	503	5.3
Isooctane	C_8H_{18}	114.22	15.10	19,230	5.72	110,000	132	2.2

Dual-Fuel

est vacuum (highest manifold pressure) at which the particular low octane fuel will satisfy the engine at low speed (see Table 1 and Fig. 1). Three premium gasolines, A, B, and X were used as L.O. fuel; two of these, A and X satisfied the engine octane requirement up to six in. Hg manifold vacuum while B required a fuel change-over at 7½ in. Hg. The manifold vacuum for change-over was critical only at low speeds near 1000 rpm. Table 2 describes the high octane fuels. The two straight hydrocarbon fuels used were iso-octane (2,2,4-trimethylpentane) and "Super X," consisting of 27 per cent by volume iso-octane plus 73 per cent RMFD-32-49 plus a total of three ml TEL/gallon. The former gave some trace

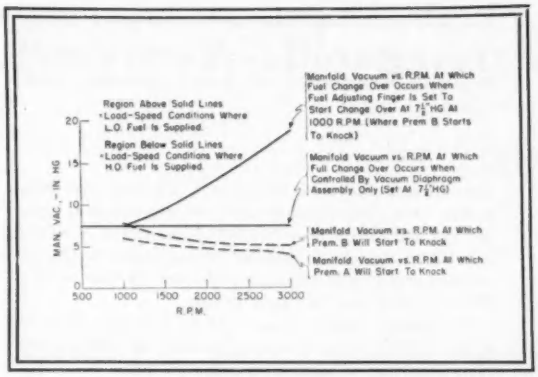

Region Above Solid Lines
•Load-Speed Conditions Where
L.O. Fuel Is Supplied.
Region Below Solid Lines
•Load-Speed Conditions Where
H.O. Fuel Is Supplied.
Manifold Vacuum vs. R.P.M. At Which
Fuel Change Over Occurs When
Fuel Adjusting Finger Is Set To
Start Change Over At 7½" HG At
1000 R.P.M. (Where Prem. B Starts
To Knock)
Manifold Vacuum vs. R.P.M. At Which
Full Change Over Occurs When
Controlled By Vacuum Diaphragm
Assembly Only (Set At 7½" HG)
Manifold Vacuum vs. R.P.M. At Which
Prem. B Will Start To Knock
Manifold Vacuum vs. R.P.M. At Which
Prem. A Will Start To Knock
MAIN. VAC. - IN. HG
R.P.M.

Fig. 4—Examples of manifold vacuum-speed conditions where fuel change-over can be made to occur compared with manifold vacuum-speed conditions where the premium gasolines would start to knock if fuel changeover did not occur.

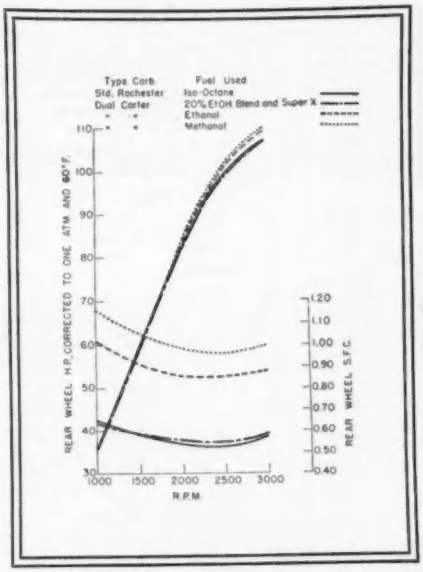


Fig. 5—Full-throttle data for dual-fuel carburetor and standard carburetor.

Test Results—*(Continued)*

knock at low speed full throttle, while the other gave light trace knock over most of the full throttle speed range from 1000 to 3000 rpm. The gasoline-ethanol blends consisted of an 80 per cent by volume blend of Premium "A" with 20 per cent ethanol and a 77½ per cent by volume blend of Premium "X" with 22½ per cent ethanol. These fuels had low speed road octane ratings considerably higher than required while straight ethanol and methanol had superior ratings. How various ethanol blends increased road and laboratory ratings of several gasolines is shown in Table 3.

As can be seen in Table 3, Premium B even with a 30 per cent ethanol blend did not road rate sufficiently high at 2500 and 3000 rpm to satisfy the engine's full throttle octane requirement; hence its ethanol blend could not be used as H.O. fuel, but the premium itself was satisfactory as a L.O. fuel when change-over from L.O. to H.O. occurred at 7½ in. Hg manifold vacuum. For the 22.5 per cent alcohol blends (no dynamometer or performance tests were made with the 30 per cent blend) the carburetor was not altered but left with the same F/A setting as with gasoline. This meant that the F/A ratio was relatively leaner when using a blend than when using straight gasoline because of the lower heating value per lb. or gal. of the ethanol blend. However, the dynamometer and road performance tests showed little or no difference since the full throttle mixture was sufficiently rich. For straight ethanol and methanol it was, of course, necessary to decrease metering rod size to enrich the mixture to obtain the F/R ratio required for maximum power. Table 4 compares physical and chemical properties of gasoline, gasoline-ethanol blends, and ethanol and

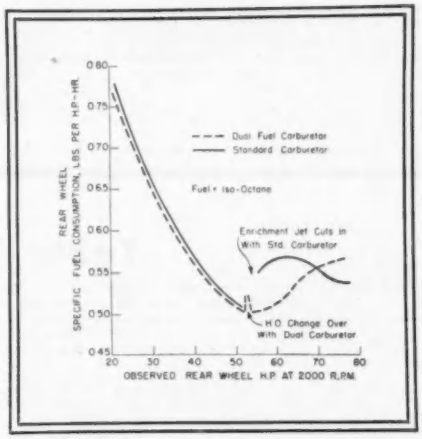


Fig. 6—Part-throttle specific fuel consumption at 2000 rpm on chassis dynamometer.

methanol. For ethanol the chemically correct A/F is 9 to 1 and an actual A/F of 8.5 to 1 was used, while for gasoline the usual A/F ratios at full throttle are from 12 to 13.5:1.

For methanol a chemically correct A/F is 6.5 to 1 and an actual A/F of 6 to 1 was desired. Even though the metering rods were decreased in size as much as possible, sufficient fuel would now flow through the jets at wide open throttle to yield a 6 to 1 A/F ratio. However, this ratio was obtained at five in.-seven in. Hg manifold vacuum. The richest A/F ratio at wide

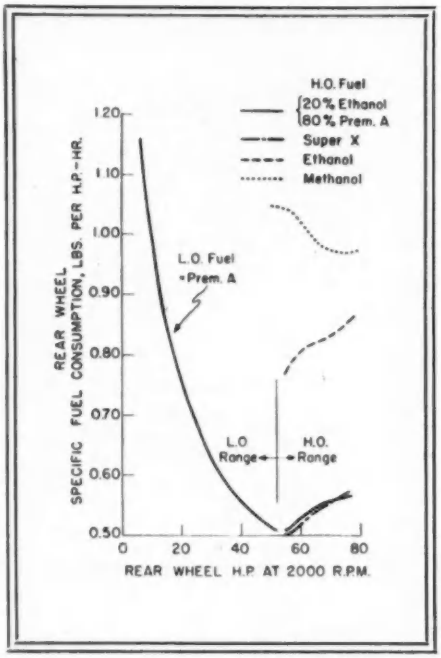


Fig. 7—Part-throttle specific fuel consumption with dual-fuel carburetor. Changeover from L.O. to H.O. occurs at approximately 50-53 hp at 2000 rpm when vacuum diaphragm control is set to 7½ in. Hg.

Test Results—(Continued)

open throttle was close to 6½ to 1, but may have been richer since dynamometer and road performance tests did not indicate a lean mixture. The power obtained was better than with gasoline, probably due to the increased volumetric efficiency obtained by the cooling effect of high heat of vaporization.

Performance tests with the 10 to 1 engine installed in a "98" Oldsmobile having a 3.23 to 1 rear axle ratio consisted of laboratory and road tests. A chassis dynamometer was used to measure rear wheel horsepower and fuel flow (both H.O. and L.O. when the dual-fuel carburetor was used) at various engine speeds from 1000 to 3000 rpm and with various manifold vacuums. Road tests consisted of road octane determinations, acceleration tests (with Hydra-matic transmission) from 0 to 70 mph, and road fuel consumption tests around a 154 mile test course. An initial 2½ deg. btdc spark advance with automatic distributor was used both for road tests and for the determinations of octane requirements. There was little or no difference in road performance using this setting as compared with factory-recommended initial setting of the distributor at five deg. btdc spark advance; however, the lower setting lowered the octane requirement a slight amount which aided in fuel selection and allowed the use of iso-octane as a test fuel with no more than trace knock. Road consumption tests consisted of many trips around the 154-mile test course with each trip being in an opposite direction from the preceding trip. The test course consisted of some city driving including the industrial section of Peoria, Ill., and also included several small towns along the open country route. The terrain was rolling with a few steep hills having grades up to five per cent. Average open road speed was held at 65 mph and the overall average speed around the test course was 50 mph.

Full throttle power and specific fuel consumption for the dual-fuel

(*Continued, page* 86)

Table 5

Road Test-Fuel Consumption Data — General Motors Research High Compression Test Engine (10:1 compression ratio) in a "98" Oldsmobile with 3.23:1 Rear Axle Ratio

Fuel	M.P.G. Total Fuel	M.P.G. L.O.	M.P.G. H.O.	M.P.G. Alcohol	Ratio: Alcohol/ Gasoline (Per cent)	Ratio: H.O./L.O. (Per cent)	Manifold Vacuum H.O. Cuts In	Acceleration, sec. from 0-70 mph	H.O. Specific Gravity	L.O. Specific Gravity
Standard (Rochester) Carburetor										
Isooctane	19.9							14.7 and 15.0	0.69	
Dual Fuel (Carter) Carburetor										
H.O. = 77.5% Premium X, 22.5% Ethanol	19.9	20.3	173	770	2.6	12.9	7.5" Hg.	15.3	.73	.72
L.O. = Premium B										
H.O. = Ethanol	19.8	22.2	122	122	19.3	19.3	7.5" Hg.	14.2	.79	.72
L.O. = Premium B										
H.O. = Methanol	19.6	22.8	100	100	22.9	19.7	7.5" Hg.	14.6	.80	.72
L.O. = Premium B										
H.O. = Super X	20.3	22.0	266			8.3	6" Hg.	15.3	.74	.71
L.O. = Premium A										
H.O. = 80% Premium A, 20% Ethanol										
L.O. = Premium A	19.8	20.1	288	1425	1.4	7.5	6" Hg.	15.4	.72	.71
H.O. = 77.5% Premium X, 22.5% Ethanol										
L.O. = Premium X	19.8	20.1	275	1225	1.6	7.8	6" Hg.	15.3	.73	.72
H.O. = Isooctane	20.3	22.2	244			9.1	6" Hg.	15.6	.69	.71
L.O. = Premium A										

Saginaw Hydraulic Steering Gear

—Its Construction and Operation

By
Joseph
Geschelin

A UNIQUE type of hydraulic steering gear which has been adopted as optional equipment on a number of 1952 passenger cars, has been placed on the market by the Saginaw Steering Gear Div., General Motors Corp., Saginaw, Mich. Except for physical size, this gear is in general the same type of unit that Saginaw has supplied for some years for heavy duty earthmoving equipment and on experimental installations in heavy duty motor trucks.

From the standpoint of design, the Saginaw hydraulic steering gear is basically the same as the passenger car recirculating ball type mechanism with the addition of a hydraulic booster linked to the pitman shaft through an added power rack. Designed to reduce steering effort but not lose the desirable effect of "feel," the power element does not come into play under light steering conditions which can be handled with four lb or less ef-

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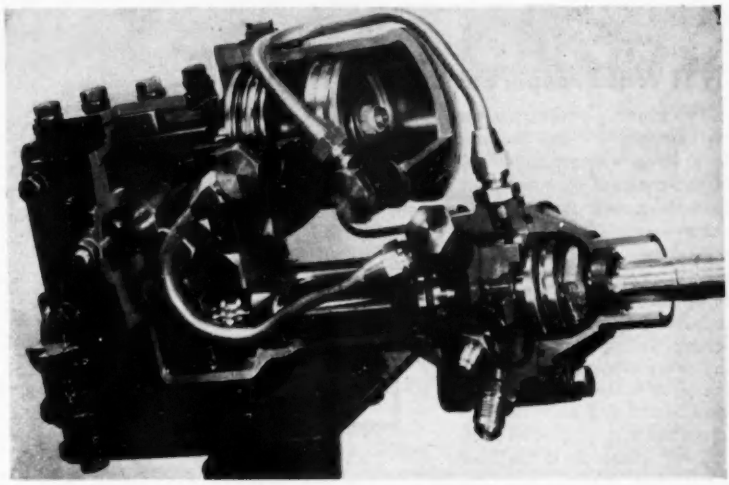
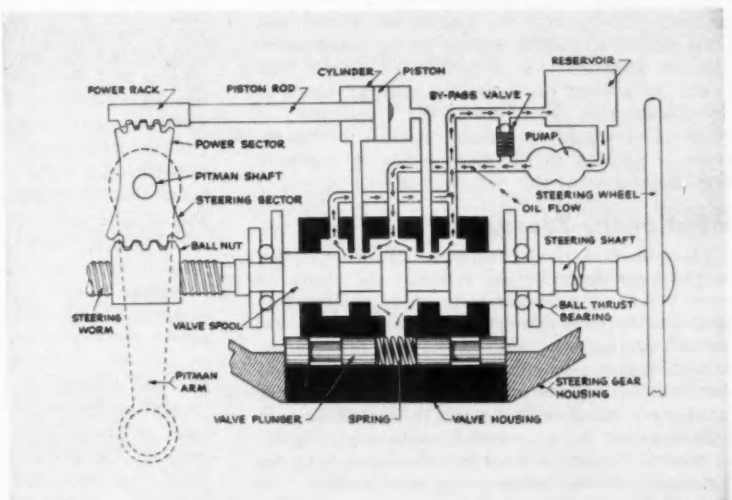


This is a photograph of a cut-away hydraulic steering gear assembly. The piston and hydraulically-actuated power rack may be seen at the top.



Schematic outline of system including the power-actuated rack and one of the valve plunger and spring sets. In this view the hydraulic system is in neutral phase.

The BUSINESS PULSE

Forecasts for Business During 1952 Are, in General, Optimistic. Shipments of Machine Tools Rose Steadily in the Second Half of 1951. The Trend of Personal Income Last Year Was Almost Uninterruptedly Upward.

1951 Was Prosperous Year

The general level of business appears to have been well sustained in the final months of 1951. The year as a whole was a prosperous one for most divisions of the national economy, and such dislocations and maladjustments as did occur are considered surprisingly small in view of the difficulties which inevitably attend transition from civilian to military output. The rapid industrial expansion and the strong inflationary pressure that were evident after the invasion of South Korea in June, 1950, continued only through about the first quarter of 1951, and for almost half the year the economy was characterized by a mild deflationary tendency. Current incoming data suggest that in the last few months the economy was in a state of approximate equilibrium.

This Survey is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Forecasts for 1952 are largely optimistic with regard to volumes of production, employment, and income. Such predictions assume, of course, that there will be no radical change in the international political situation that underlies the defense program. At present that program is going ahead in accordance with the views of the "moderates" in Washington—those who caution against forcing defense production to maximum levels in minimum time, regardless of the economic effects.

Inflationary Pressures

There has been no reversal as yet of the relaxation in consumer demand that followed the waves of scare buying in 1950 and early 1951, and many of the predictions for 1952 are based on the belief that no such reversal will occur in the next few months. Accordingly, it seems to be fairly well agreed that there will be no immediate reappearance of dangerous inflationary pressures. As to the second half of 1952, however, there is more divergence of opinion. In general, Government officials connected with defense and stabilization activities tend to stress the likelihood of increasing inflationary pressure as the defense effort moves toward established goals, while private observers appear more inclined to emphasize the possibility of a continuing lag between the curtailment of civilian production and the expansion in military deliveries. While there does exist this difference of opinion as to how soon and how strongly the upward price pressure will be resumed, there seems to be tacit agreement in most circles that a major recession in activity or prices is improbable so long as the demands of the national defense program continue at anything approximating the present and prospective scales.

Supply Shortages

With income and demand expected to be maintained at high levels, the chief worry of the businessman is the threat of supply shortages. Government officials continue to warn of the coming impact of the defense program on civilian output. Military production is rising at the rate of a billion dollars a month, according to Defense Mobilizer Charles E. Wilson, who believes that the tightest pinch on the civilian sector will come in 1952. Charles Sawyer, Secretary of Commerce, while declaring that the business outlook for 1952 is good, also warns that shortages of such essential materials as steel, copper, and aluminum may continue throughout the entire year. Indeed, new estimates by the Department of Defense have reportedly led to the belief that shortages are likely to persist at least through the first half of 1953.

There does not exist, however, a uniformity of opinion with regard to the probable duration of shortages, and many industrialists discount the more extreme official estimates. R. F. Sentner, for example, who is an executive of the United States Steel Co. and director of the iron and steel division of the National Production Authority, declares that some current estimates are "totally meaningless" as measures of the unbalanced condition of demand and supply. "The point of balance in most products is closer than may appear. There is considerable evidence that steel inventories are accumulating in many places," he states.

(*Turn to page* 104, *please*)

Army's Newest Cargo Tractor

This view shows the M8E2 Cargo Tractor equipped with a stake body for general-purpose hauling.

THE M8E2 Cargo Tractor, latest of Army Ordnance's line of vehicles, is now in production at the Allis-Chalmers plant in LaPorte, Ind. Subcontracts have been awarded to approximately 25 midwestern plants by Allis-Chalmers, and more than 300 plants are supplying parts.

One of the outstanding features of this tractor is the interchangeability of its parts with other vehicles in the light tank family, the chassis being basically the same as that of the Walker Bulldog tank. It is powered by the Continental air-cooled engine and the Allison cross drive transmission. This power package gives the versatile 22-ton tractor a top speed of 40 mph, with the ability to cross swamps and small trenches, to climb or descend sixty per cent slopes, and to travel speedily on improved highways. These features have been designed into the tractor to permit it to tow guns quickly into position.

Further versatility of the machine is made possible by several interchangeable kits. These kits are different types of tractor bodies which fit the vehicle for pulling the Skysweeper, the 90 mm antiaircraft gun, the 155 mm gun, or the eight-inch howitzer. In addition, there are wrecker kits, bulldozer kits and stake body kits. The latter converts the cargo tractor for general-purpose hauling.

When used to pull artillery, the cargo tractor carries ammunition and supplies, supplementary equipment and a gun crew. Two front seats carry the driver and assistant driver. The assistant driver has access to certain dual controls as well as radio controls. He also operates a caliber .50 machine gun, mounted directly above him.

• • •

The Aluminum Industry in 1951

By Donald M. White
Secretary, the Aluminum Association

FOR the U. S. aluminum industry, the year 1951 was one of top production, new plant projects to expand its capacity, and increasing curtailment of civilian use. Although the industry increased its primary capacity about 20 per cent during the year, curtailment in the use of the metal for nonessential purposes became more drastic as the year progressed, because of the mounting demands of our accelerating defense program, the reduction of imported metal, and the freezing of normal scrap circulation. In spite of the short-supply conditions which prevailed throughout the year, however, a number of important new uses came into production. Some of these were stimulated by the still greater shortages of other nonferrous metals and scarcities of other competitive materials.

On the basis of actual figures for the first 10 months, the year's total production of primary aluminum in the United States is estimated at approximately 1,680,000,000 lb. This was almost 17 per cent above the 1950 production. It would have been still higher had

(*Turn to page* 88, *please*)

Special Machine
Punches Slots
in Jet Engine Shroud Rings

A UNIQUE hydraulically operated automatic piercing machine recently introduced by Danly Machine Specialties, Inc., Cicero, Ill., is designed specifically to meet the need for a rapid and accurate means of piercing slots in jet engine shroud rings. One of the machines, intended for shipment to Britain, punches 80 slots in a stainless steel alloy ring in less than five minutes. Obviously, the time-saving provided by this equipment should have an important effect upon speeding productivity on jet engine projects.

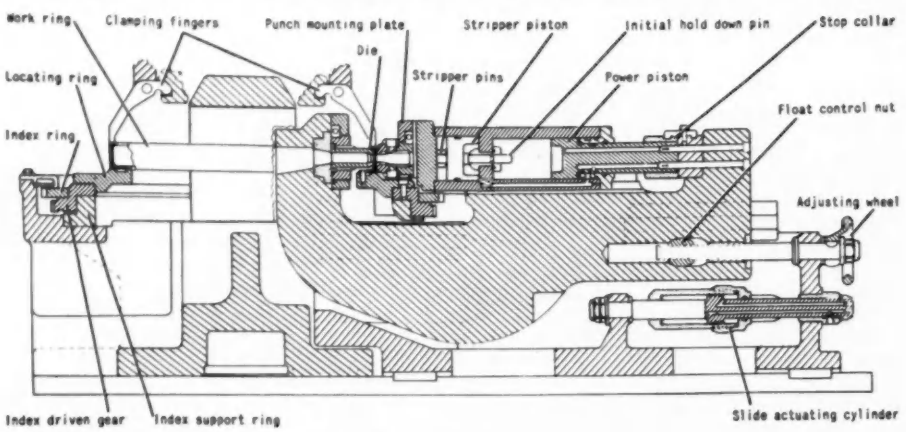
The same type of machine, suitably modified, should be useful in piercing a variety of automotive parts, including tire rims and wheels, where a multiplicity of pierced holes or openings is required.

The equipment illustrated here was initially developed by the

(*Turn to page* 112, *please*)

(Left) Front view of the hydraulic piercing machine.

(Below) This sectional view on the center line of the piercing cylinder shows the relative locations of the power cylinder, work ring, clamping fingers, punch and die, C frame, indexing mechanism, and slide actuating cylinder. The C frame slides on long gibs mounted on the cradle, while the hydraulic cylinder moves on independent gibs mounted on the C frame. The adjusting wheel is used to shift the C frame when a change is made to a work ring of a different diameter.



"That's it! I'll bet that's the answer to my coating problem"

"Ted Hubbard, what *are* you talking about?" asked his wife.

"That wax paper you're tearing . . . that may be the answer to the thing that's been giving the can manufacturers all the trouble."

Ted, an Inland mill representative, had been working for some time on a very peculiar problem in the plant of a large can maker and Inland tin plate customer. In lacquering tin plate for can ends, this customer's sheets had been coming through with "eye holes" (pin-head-size spots where lacquer failed to coat). Neither Ted, nor anyone else, had been able to learn *why*.

Ted, idly watching his wife tear wax paper from a roll, remembered: *Wrapping tin plate packages in wax paper was standard practice for many steel producers, and paraffin, a mineral oil derivative, would not mix with lacquer.*

Ted had a hunch.

Next day, the problem was solved! Ted proved that when the tin plate was removed from the wax paper wrapper, microscopic wax particles adhered to the edges of the sheets. During the lacquering process, these particles were drawn up from the edges and across the sheets by suction from the lifting device . . . were picked up by the roller coaters . . . and wherever a particle lodged, lacquer failed to coat that spot on the sheet. This was the cause of the eye holes.

Tin plate producers switched to a different type of paper wrapping with the result: no more eye holes! INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago 3, Illinois.

Names used are fictitious

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Is Inland's Job

Your Scrap is Needed by The Steel Industry for National Defense

NEW EQUIPMENT PLANT • PRODUCTION

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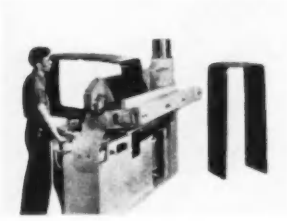
J-5—Tangent Bender

The Cyril Bath Co., Cleveland, Ohio, have announced the availability of the model F single-wing tangent bender



Bath tangent bender.

which has been engineered to shape flanged sheets around fixed radiused corners without wrinkling. It facilitates rapid, accurate forming of metal shapes having two or four radii corners. Of the open throat design, the ram latches with bed the last inch of travel and exerts up to 17 tons vertical pressure.

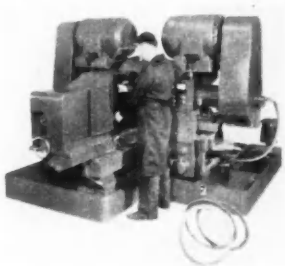
This bender features automatic positioning of the metal to be formed.

The model F tangent bender is available in three types having die space of 48, 36 or 24 in. It can be furnished for air or hydraulic operation and with controls for completely automatic cycling or with separate ram and wing controls for manual operation. Air-operated machine utilizes standard 70 psi line pressure and requires two cu ft of air per cycle.

When the tangent bender is equipped with automatic sequence control, the complete cycle is performed in 4½ sec. With manual control, the cycle requires 7½ sec.

J-6—Grinder

The Gardner Machine Co., Beloit, Wis., has developed a double spindle



Gardner clutch plate grinder.

grinder for grinding parallel sides of steel or bronze-faced clutch plates. Plates ranging from 12½ in. to 19 in. OD, and measuring approximately 0.126 in. thick, can be handled.

A heavy cast iron base supports the grinding head slides on dove-tailed, ball

(*Turn to page 58, please*)

News of the Machinery Industries

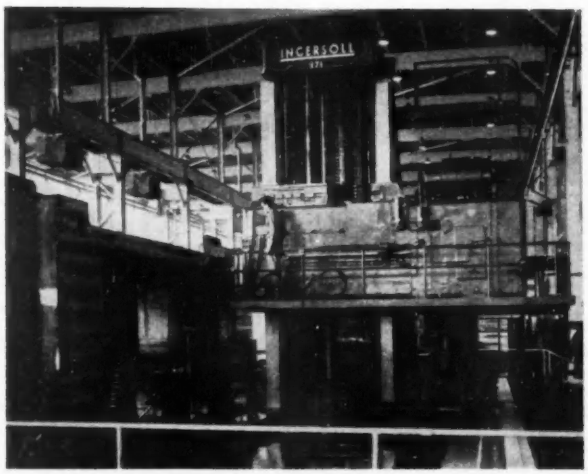
New Machine for Tool Builder

E. W. Bliss Co. has recently installed in its Canton, Ohio, plant a giant Ingersoll horizontal milling and boring machine designed for work on large steel rolling mill housings and press frame sections. Weighing nearly 400,000 lb—exclusive of floor plates—the machine has a ram 24 in. square which will extend into pockets 74 in. deep. Vertical travel of the head is 12 ft; the housing has a horizontal travel of 40 ft. The spindle is driven by a 75 hp motor; total horsepower developed by all motors used to operate the unit is 195.

Needed—Better Tooling

According to a consensus of industry, revealed by the ASTE, all-out production of machine tools alone will not be sufficient to enable the nation's industries to tool for the dual job of pro-

(*Turn to page 66, please*)



A 100,000 lb steel weldment, which will eventually be the bed of a Bliss stamping press, is shown being machined by a huge Ingersoll horizontal milling and boring machine.

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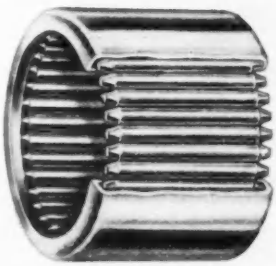
Torrington Needle Bearings need no elaborate, expensive housings. A straight bore—machined to proper dimensions—is all that's required. No positioning shoulders... no spacers... no retainers! Simple to install, Needle Bearings are seated by press fit. An arbor press operation does the job easily and quickly.

Reductions in the size—and weight—of housings and related parts are also possible because of the compactness of Needle Bearings. Stronger, more economical designs often result. Want more details? Then drop us a line, today.



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Landis plain cylindrical grinder.

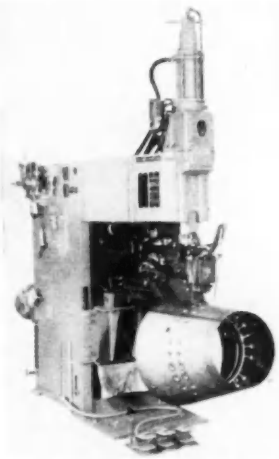
(*Continued from page 56*)

bearing ways. Each head, with its four in. spindle, is provided with a tilting feature which permits setting the 26 in. diam abrasive disk at the proper angle for best grinding results.

On the front is mounted a hydraulically operated, sliding work table upon which the special fixture is carried. Three variable speed, grooved rollers riding on the ID of the clutch plate, rotate it during the grinding operation. Two of these rollers are power driven, and the third is movable so it can be released to permit loading and unloading. This is a wet grinding operation.

Production averages 35 to 40 pieces per hour, removing 0.010 in. overall stock. Tolerances of 0.001 in. to 0.002 in. for parallelism, and 0.005 in. for uniformity are maintained.

J-7—Resistance Welder



Cone assemblies for jet aircraft engines are now being produced by resistance seam welding on a welder developed by Taylor-Winfield Corp., Warren, Ohio. Equipped with a special planetary heat, the welder makes a continuous circular seam weld around individual coupling connections located at regular intervals around the jet cone assembly. As each coupling is welded the assembly is progressively shifted over a clamping die until each subsequent coupling has been brought into line between the welding electrodes. One man controls the entire operation through use of a foot pedal.

J-8—Grinder for Jet Blade Tips

A high production plain cylindrical grinder for grinding blade tips of jet engine motors has been developed by the Landis Tool Co., Waynesboro, Pa.

This machine is identified as a 30 in. by 48 in. type CHW plain grinder with special work heads. Each headstock drive is an a-c motor and power is transmitted to the spindle by means of multiple vee belts.

All controls are located so that each head may be individually operated. The work carriage moves by hydraulic power. A 30 in. by 3 in. by 12 in. grinding wheel is driven by a 15 hp motor. The wheel spindle is rotated in Landis Microsphere spindle bearings.

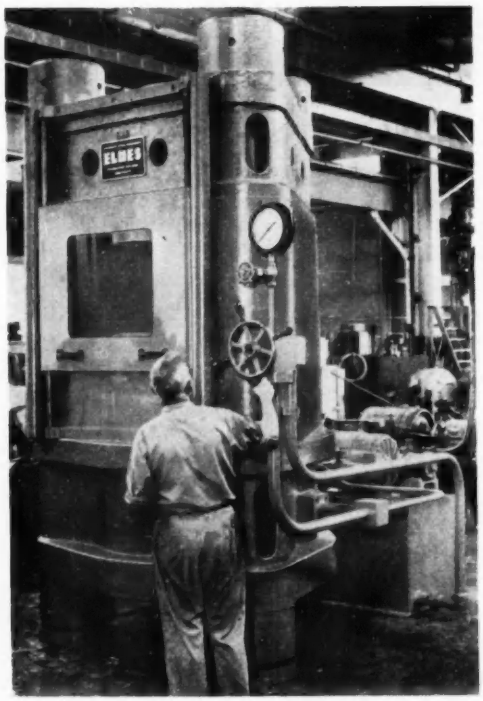
J-9—Hobbing Press

A large hydraulic hobbing press of 2500 tons capacity has recently been built by the Elmes Engineering Div., American Steel Foundries, Cincinnati, Ohio. This press and several others of like capacity have been designed for aircraft gas turbine engines and accessories.

These presses will have an unusual application. They will be used primarily for die quenching. This operation involves a quick-cooling of hot forgings while restrained in a die under extremely high pressure.

Specifications

Weight, approximately: 50,000 lb
Overall height: 10 ft.-8 in.
Between columns, L-R: 39 in.
Opening, platen to head, max.: 32 in.
Stroke: 15 in.
Speeds of Operation:
Advance—10 ipm.
Press—½ ipm.
Return—20 ipm. (gravity)



Elmes hydraulic hobbing press.

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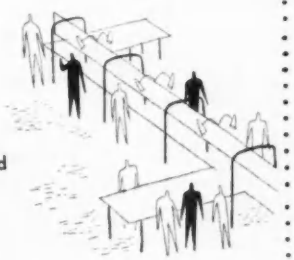
- **These same insulating materials are used to double the power per pound ratio in electric machines.**
- **Silastic,* the Dow Corning silicone rubber is used to seal hot air at 600°F., hot oil at 350-400°F., limit switches and bomb bay doors at —100°F.**
- **Dow Corning Silicone oils and greases make permanent lubrication a practical reality.**

To many engineers and executives, such silicone facts as these still sound too good to be true. That's why we have built and assembled 16,000 pounds of demonstration units and typical applications to prove that our silicone products will do all that we claim for them. This is the first comprehensive Silicone Exposition ever assembled. Previewed in Washington, D. C. during the week of October 22nd, this exhibit will be given private showings in major industrial centers across the country.



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NEW PRODUCTS

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K-14—Lift Trucks

The FT Series of fork lift trucks, have been recently disclosed by the Buda Co., Harvey, Ill.

Buda "safelined" designed FT series of fork lift trucks powered with either a Buda Diesel or Buda gasoline engine, are available in 12 models on solid or

Buda fork lift trucks, series FT.

cushion tires in capacities of 3000, 4000, 5000, 6000 and 7500 pounds at a 24 in. load center and 4000 lb capacity at an 18 in. load center.

Special features of Buda's FT fork trucks include: all roller construction mast with special rolled mast channels; two speeds forward and two speeds reverse single lever gear shift; quick change heavy duty clutch; complete complement of electrical gauges on full front vision instrument panel; carriage mounted on patented adjustable side thrust rollers to reduce wear; complete accessibility of all parts for maintenance and servicing; and standardization and interchangeability of parts between all 12 models.

K-15—Tubing

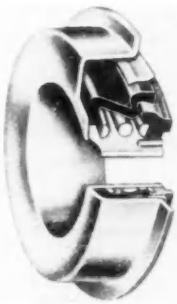
Aluminum Co. of America, Pittsburgh, Pa., has announced its latest product — Alcoa Utilitube — which is said to be suitable for a variety of industrial uses. It is a general purpose aluminum coiled tube made of new Alcoa aluminum alloy B50S-O. It combines low cost per foot, easy workability and high fatigue strength, according to the company.

Alcoa Utilitube can be used in fuel oil, gasoline and lubricating oil lines for internal combustion engines; also in air, vacuum and hydraulic lines for brakes and instruments. The product will handle kerosene, cutting compounds for screw machines and lathes, or refrigerants with the exception of methyl chloride.

K-16—Seal for Liquids

A synthetic rubber flexing member encloses the spring of the type 11A seal developed by Crane Packing Co., Chicago, Ill., to protect it from corrosive liquids. An advantage claimed is that the retainer does not contact the shaft so that various shaft sizes, namely ⅜ in., ½ in., ⅝ in. and intermediate shaft diameters can be handled with one size seal.

This seal is recommended for shaft speeds of 6000 rpm and over and for installations where shaft vibration is encountered. It is also designed to handle pressures up to 50 psi and temperatures to 212 F. Additional features: the type 11A seal is compact—a "pressed-in," one unit seal; the washer is held stationary by a metal retainer.



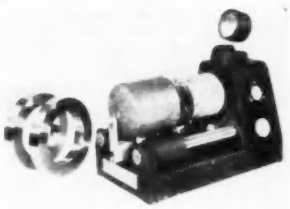
Crane pressed-in seal.

K-17—Speed Reducers

The Westinghouse Electric Corp., Pittsburgh, Pa., type DB speed reducer is particularly designed to satisfy the conditions of the problem of coupled motor and gear drive and at the same time provide an appreciable amount of compactness with resultant saving in space. Mechanical parts (gearing, housing, etc.) of type C and type E gearmotors have been adapted to speed reducer construction by substitution of a bracket with necessary additional pinion shaft and bearings for the normally "built-in" motor used in gearmotor construction.

Eight sizes of units are available providing gear ratios from 6.25 to 58.3 to one and ratings from approximately ⅓ to 150 hp depending upon the particular gear ratio and motor speed required. Standardized fabricated steel bedplates to support motor and gear unit, as well as the necessary flexible couplings, are available for each size.

K-18—Air Gage

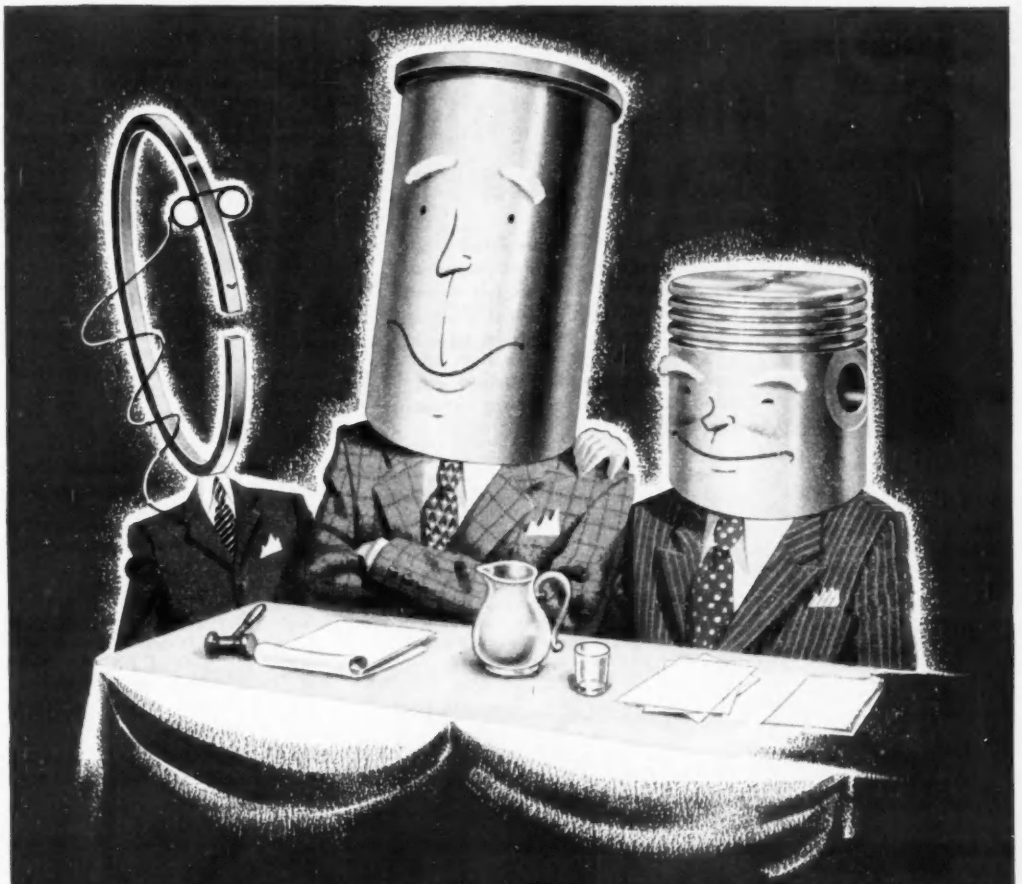


Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn., has developed a special Air-O-Limit gaging fixture for checking the bores of compressor housings. These housings are deep drawn sheet steel. They have an average internal diameter tolerance of 0.002 in., and a maximum out-of-round tolerance of 0.015 in. The gage checks the housing bore for average diameter at several points along the entire length of the internal wall. The gage has a ball bushing slide on which the housing is located from its outside diameter. This slide is also used to move the housing on and off the gaging plug. Gaging plug has six cart idge-type gaging nozzles that feed from one gaging unit. Amount of air that escapes from these nozzles combines to give an average diameter reading on the indicating meter. The indicating meter is calibrated with full scale of 0.016 in.

K-19—Heat Resistant Plastic

Development of a polyester laminating resin which will withstand tempera-

(*Turn to page* 70, *please*)



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Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

H-13 Clinch Nuts

Richard Bros. Div., Allied Products Corp.—A recently published leaflet describes and illustrates clinch nut tooling.

H-14 Valve Lubrication

Minneapolis-Honeywell Regulator Co. —An article reprint entitled "Proper Valve Lubrication—A Prerequisite to Good Control" is available.

H-15 Lathes

Lodge & Shipley Co.—Chip Tips No. 16, describing the production of aircraft engine mounting lugs on a Copymatic lathe, is ready for distribution.

H-16 Protective Coatings

Flintkote Co. — Industrial Products Digest—a 24-page, booklet briefly describes many of the firm's standard and specialized products.

H-17 Mechanical Tumbling

Roto-Finish Co.—An illustrated booklet, just published, describes the Roto-Finish process. Equipment available is also listed.

H-18 Jet Parts

Ex-Cell-O Corp.—Data on jet engine parts manufactured for the P & W J-42 are given in the recent issue of "Tool Tips."

H-19 Fasteners

Industrial Fasteners Institute—The use of fasteners in military equipment is described in Volume seven, number four of "Fasteners."

H-20 Bearings

Torrington Co.—Volume II, number six of the "Bearing Engineer" is now available. Presses used for Ford body stampings are described.

H-21 Milling

Cincinnati Milling and Grinding Machines, Inc.—Volume eight, number four of the publication "Report" gives some interesting illustrations on the milling of aircraft parts.

H-22 Trends

Ex-Cell-O Corp.—The 1952 edition of "Business Trends and Progress"—a graphic portrayal of business booms and depressions—has been released.

H-23 Chucks

Sutton Tool Co.—Just published is a catalog describing the company's Levermatic collet chuck.

TIME SAVER COUPON

THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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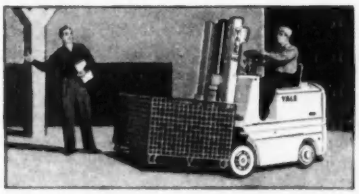
START

STOP

START



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By ROBERT McLARREN

America Leads

British leadership in the aircraft gas turbine field has lasted so long that it is refreshing to record an uncontested U. S. "first" in this field: a gas turbine powered helicopter. Kaman Aircraft Corp. has made initial test flights successfully with its K-225 helicopter powered by a Boeing XT-50 turboprop engine, the first gas turbine powered helicopter in the world. The engine is the well-known Boeing 502 small turboprop delivering 210 shaft horsepower for takeoff with a rated power of 175 hp. The machine is the standard Kaman HTK and HOK production designs. These latter models use a 225-hp Lycoming piston engine. In spite of the reduced power available from the Boeing unit, the combination of the turboprop and the helicopter is a "natural" insofar as both operate most efficiently at constant speed. The new aircraft is for experimental research only but unquestionably is the beginning of a whole family of "turborotor" helicopters. The Navy has already ordered the Boeing unit into quantity production for landing craft and other surface-vessel installations because of its low weight of only 200 lb.

Turbine Battle Fuel

More fuel for the already-hot turbine-vs-piston engine transport argument is the announcement that Douglas has developed a new version of the DC-6 powered by four Wright R-3350-30W compound engines. Known as the DC-7, the new transport features an additional three ft of length and eight tons of gross weight, plus numerous detailed refinements. American Airlines has ordered 25 of the new transports for delivery in 1953. The controversy stems from the fact that this piston-engined transport will have a top speed of 400 mph and will cruise at 363 mph, which is well within the realm usually considered the exclusive domain of the turboprop engine. The Navy has ordered two Lockheed R70-1 Super Constellation transports powered by four Pratt & Whitney T34 turboprop engines, which will give this new transport a cruising speed of 394 mph at 25,000 ft.

Comparison between these two aircraft shows that the Douglas will have 3500 hp engines, whereas the Lockheed will have 5500 hp engines, accounting for the difference in speed. Fuel of the controversy, however, is contained in the fact that the T34 has a specific fuel consumption of 0.64 lb/hp/hr, whereas the Wright Turbo-Compound engine specific fuel consumption is only 0.39 lb/hp/hr. Technical comparisons between the two would consume dozens of pages of slide rule manipulations so that it is clear that the issue between the two is far from the clear-cut conclusion of the strong turboprop advocates.

Completing the Circle

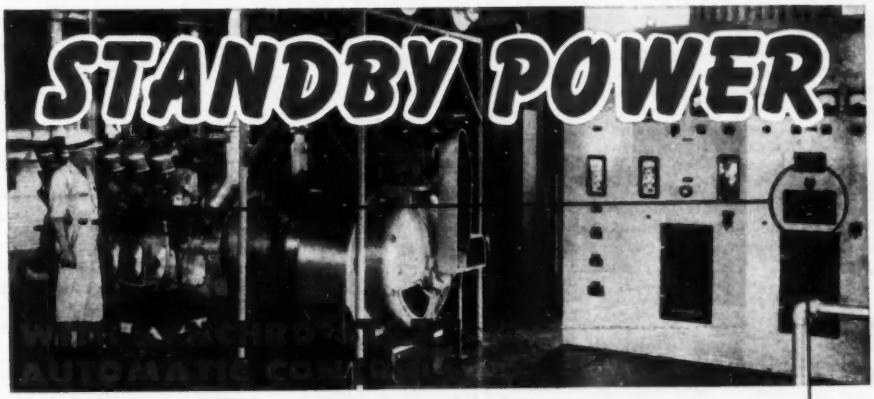
Announcement of $99 trans-continental fares by United and American airlines brings full circle the bitter, tragic and paradoxical career of the non-scheduled airlines. In Airbriefs we have long supported the *principle* of the non-scheduled airline operated by returning Air Force veterans but the miserable safety record of these operations long ago shook our faith in their capacity to offer service comparable with that of the scheduled airlines. However, the merciless and grossly unjust campaign of the Civil Aeronautics Board against non-scheduled operators accounts in large measure for their failure to strengthen themselves to the point permitting first-class maintenance and operational procedures.

That the scheduled airlines have now been driven down to the $99 fare level—the magic figure on which the nonskeds built their business—is a direct and uncontested result of nonsked competition and the millions who fly by air in the future will owe this saving to the unbelievable sacrifice of the dozens of non-scheduled airlines which no longer exist. It is one of the blackest records of unfairness in the history of Government control of U. S. aviation but it is now only that: just history. The scheduled airlines can take no credit whatsoever for reducing their fares to the lowest in aviation history—the nonskeds forced them to it, but lost their existence in the process. The American flying public is the beneficiary of their sacrifice.

Nonsense Confounded

The Air Force security mess has been confused and confounded beyond all human understanding yet Alice continues in her Wonderland. Latest nonsensical situation is that posed by the Boeing XB-52 bomber, which Air Force Secretary Finletter says is going to be kept a military secret—permanently. While all of us must agree with the high-minded purpose such a policy embraces, the simple fact is

(*Turn to page* 120, *please*)



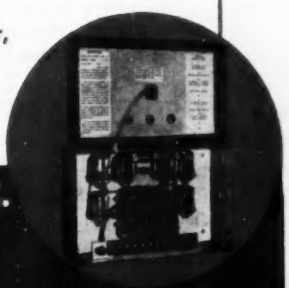
"Installation at LEBANON, OHIO, for the TEXAS EASTERN natural gas pipe line."

The need for automatic standby power has increased from year to year due to the vast savings they have afforded. Now, with the imminent possibility of bombing our cities and disrupting essential services, the need has greatly increased and deserves serious consideration by all power users.

For the past twenty years, SYNCHRO-START has made dependable controls to automatically start these power plants when power was required, and to stop them when power was no longer needed; also, to protect the power plants and their equipment from damage due to abnormal conditions while starting and running.

The above picture is typical of the many thousands of other SYNCHRO-START automatically controlled standby power plants that are in use throughout the world under every conceivable power requirement; on land, sea, in the air, and in the mines.

Contact your Architect, Engineering Firm, Engine Dealer, or Engine Manufacturer, for further information, or write us about your needs and our nearest representative.



SYNCHRO-START PRODUCTS, INC.

Automatic Engine Control Equipment

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Machinery News

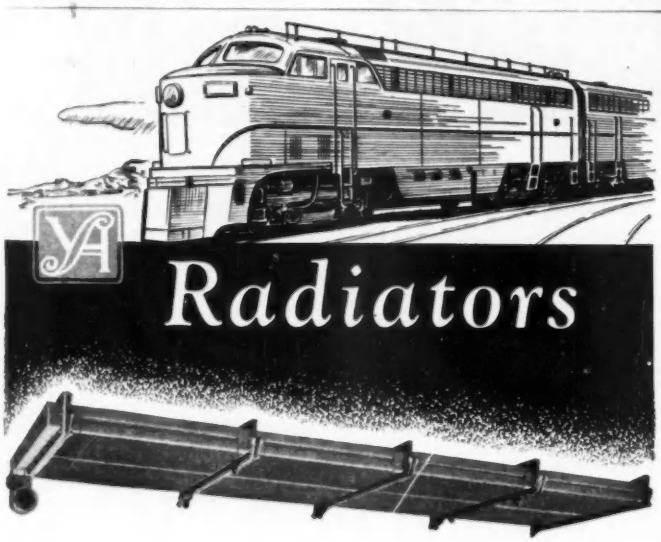
(*Continued from page 56*)

viding both military and economic security. Only seven per cent of the firms queried believe that production alone will solve the present tooling problems. In general, the returns indicate, industry puts the need for better machine tools far ahead of availability of more machines.

It was noted in the tabulations that the size of the responding company—as judged by new equipment purchases—had little or no influence on the question of need for better manufacturing equipment. The companies questioned, according to the ASTE, are almost unanimous in demanding that the producers of all kinds of manufacturing equipment should devote some time and effort right now to the developing of more efficient and better tooling.

Industrial Facilities Expansion

INDUSTRY	Number	Thousands of Dollars		Tax Amortization Allowed as a Percentage of Proposed Investment
		Proposed Investment	Tax Amortization Allowed	
Machine tools	90	64,554	48,062	74.5
Metalworking machinery, except machine tools	24	10,306	7,237	70.2
Machine tool accessories, other metalworking machinery accessories and machinists precision tools	79	16,931	12,726	75.2



. . . *right for diesel locomotives*

Standard bearer of modern American railroads — the diesel locomotive is among the toughest of all radiator applications. Its space limitations, power concentration and vibration characteristics are as critical or more so than any in industry.

To lick these problems, more than half of the leading diesel locomotive manufacturers in the United States turn to Yates-American.

. . . *right for your application, too*

Whatever your products — trucks, tractors, compressors, power plants — you can be sure of best results with Yates-American radiators. Write today for full information.

California Representative: E. E. Richter & Son, Emeryville, California

YATES-AMERICAN MACHINE CO.

HEAT TRANSFER PRODUCTS DIVISION • BELOIT, WIS., CHICAGO, ILL.

Facilities Expansion

Latest information released from the Defense Production Administration states that manufacturers of machine tools, cutting tools, dies, gages, jigs, and fixtures will receive the first priority on applications involving the expansion of industrial facilities. The accompanying table gives a summary of the fast tax write-offs permitted in these industries up to Oct. 19, 1951.

A new 26,000 sq ft plant has been erected at Sheboygan, Mich., by Detroit Tap and Tool Co. The plant represents an addition to the company's facilities in Detroit. It was constructed to take care of the firm's increased business on taps, thread gages, thread milling cutters and other threading tools.

Signalizing the opening of its new administration building, National Broach & Machine Co., Detroit, Mich., held open house recently. The new and modern office building now houses all of the executive and engineering offices of the company.

The Warner & Swasey Co., Cleveland, Ohio, will construct a new $1.5 million plant in New Philadelphia for the manufacture of machine tool parts. To be located next to the firm's present Gradall plant, it will be a one-story plant with 110,000 sq ft of manufacturing space plus a heat-treating department, shipping facilities, plant offices, etc. Completion of the plant is expected by June. Maximum employment is anticipated to reach 500.

Gear Index

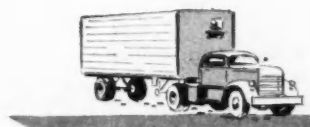
The AGMA index for October is 703.4. Using the 1935-39 base, the gearing industry shows an 11.6 per cent increase over September (630.1). Backlog has increased to almost $3 million.

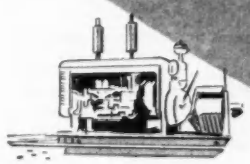
Jet Tool

A rotary draw former, devised by the Cyril Bath Machinery Co., Cleveland, Ohio, has been unveiled by the com-

(*Turn to page 68, please*)

30,000-FOOT ANSWER TO YOUR GROUND-LEVEL HEADACHE





Look to the sky for the answer to valve troubles on your truck, industrial, and off-the-road engines . . .

The same principles of valve design and fabrication that help make aircraft engines fly higher, faster, and longer between valve overhauls can be applied to your engines.

Sodium-cooled valves operate at lower head temperatures and last hundreds of hours longer without burning . . . Thompson-developed high-heat-resistant alloys prevent untimely warping and distortion of valves. Thompson designs tailor the cooling capacity of the sodium-filled valve to the needs of the engine.

Thompson engineering provides the best valve to handle severe operating conditions. We'd like to explore the adoption of sodium-cooled valves with your engineers.

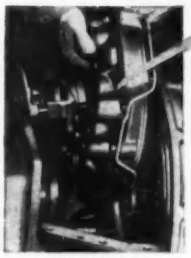
VALVE DIVISION

Thompson Products, Inc.

EUCLID, OHIO

YOU CAN COUNT ON THOMPSON FOR ENGINEERING LEADERSHIP

A CLUTCH YOU CAN CHANGE IN 80 MINUTES



LIFTING THE CLUTCH OUT OF POSITION

AT YOUR SERVICE

At the other end of your telephone is CLARK'S world-wide Service Organization ready to give you every needed help where you need it—when you need it. You'll find the Service Organization nearest you listed in your Classified Telephone Book under "Trucks, Industrial."

THE CLUTCH is far and away the most vulnerable part of a fork-lift truck. It takes the brutal strain, torture and wear each day of hundreds of stops, starts, "inching" maneuvers, shifts from forward to reverse and vice versa. In just one week of work it takes more punishment than your car's clutch takes in a year.

CLARK Engineering has produced a better clutch—a clutch that stands up longer under severe use than any other we know of in the fork-truck field. Yet even these superior clutches reach the point where replacement is an unavoidable necessity.

But here, too, CLARK Engineering has demonstrated its superiority by producing:

★ **a truck design which is unrivalled for simplicity, speed and economy in the removal and replacement of a worn clutch . . . a design in which clutch-replacement requires a mere 80 minutes . . . less than an hour and a half!**

This QUICK-CHANGE CLUTCH is just one of MANY good and important reasons why it pays to standardize on CLARK equipment for handling materials.

Fill in the coupon, attach it to your letterhead and mail it.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS

AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 68, MICHIGAN

☐ PLEASE HAVE REPRESENTATIVE CALL

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Machinery News

(*Continued from page* 66)

pany. It is on order by many of the leading jet engine producers, according to a company announcement. The machine is produced in sizes from 12½ to 100 tons.

Corporate Changes

Farrel-Birmingham Co., Inc., Ansonia, Conn., machinery manufacturer, has acquired the common stock of Consolidated Machine Tool Corp., Rochester, N. Y., part of the consideration being securities of Farrel-Birmingham Co. The Consolidated plant will be operated as a subsidiary of F-B.

Corporate title of the Charles H. Besly & Co., tap and grinder maker, has been changed to Besly-Welles Corp., Chicago, Ill. No changes in personnel or production facilities are involved.

Golden Anniversary

This year signifies the 50th anniversary of the Rockford Machine Tool Co., Rockford, Ill. A program is being prepared to celebrate the event.

Tool Orders Drop

Although shipments of machine tools during Nov., 1951, rose slightly, new orders dropped sharply from the previous month, and the ratio of unfilled orders to demonstrated production capacity also declined. Nov. shipments brought the index up to 225.7 — the highest for the past nine years. The new orders index, however, dropped down to 332.6 from 403.9 in Oct.

Reasons for the decline are believed to be the natural slow-down after peak ordering of recent months, the Government order banning shipment of machine tools to holders of unrated orders after Feb. 1, and the small effect of orders being booked with foreign manufacturers. It is also believed that some orders which were unrated were held up while customers sought to get them on a rated basis. Unfilled orders on the books amounted to 20.8 months at the end of Nov.—a decline from 22.2 months, 30 days earlier, and from 23.5 months in Sept.

Orders for machine tools from foreign customers dropped during Nov. to the second smallest index rating since the start of the Korean war in June, 1950. This is believed due to the increased activity of foreign machine tool builders, principally in Germany, Belgium, Switzerland, France, and Italy.

AUTOMOTIVE INDUSTRIES
Keeps You Informed

N-A-X AC9115 ALLOY STEEL offers a means of reducing the use of critical alloy steels of the "stainless" type in gas turbine and similar applications. In specific cases it has replaced over half the amount of strategic material originally required, with no sacrifice of quality.

SCRAP STEEL

N-A-X AC9115 ALLOY STEEL has high strength and toughness values at temperatures ranging from −70° F. to +1,000° F. It can be readily cold formed into the most difficult shapes; its response to welding by any process is excellent. It must, however, be suitably coated for protection against cold or hot corrosion.

Investigate the outstanding properties and characteristics of N-A-X AC9115 ALLOY STEEL and, through its use, conserve the critical material so necessary to our nation.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division • Ecorse, Detroit 29, Michigan

NATIONAL STEEL CORPORATION

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 62

(*Continued from page 60*)
tures as high as 500 F, has been announced by Naugatuck Chemical Div., United States Rubber Co., New York, N. Y.

The resin is expected to find its most significant use as a structural material in the manufacture of high-speed aircraft and guided missiles. It has physical and handling properties comparable to other types of polyesters now available with the added benefit of high strength at high temperatures.

Laminates made with the resin and glass fabric retain good flexural strength (40,000-47,000 psi) when exposed for as long as 200 hr at a temperature of 300 F. Good flexural strength (over 30,000 psi) is also obtained when exposed for as long as 24 hr at 500 F. The heat resisting properties of the resin are made possible by the use of a new chemical, triallyl cyanurate.

Initially the resin will be available for military applications. However, Naugatuck Chemical is boosting production capacity in order to supply resin fabricators who require heat resistance for applications in the electrical and electronic industries. It is being marketed as Vibrin X-1047.

General Properties of Uncured Vibrin X-1047

Appearance	Clear straw
Hellige color	#5
Viscosity (Disc) @ 25C	45 poises
Refractive Index @ 20C	1.5156
Specific gravity @ 25C	1.209
Cure rate @ 110C (metal cell)	87 sec
Cure rate @ 100C (10 & 75 mm. tube)	160 sec
Cure rate @ 80C (10 & 75 mm. tube)	1200 sec
Storage Stability	
Uncatalyzed @ 25C	over 6 months
Uncatalyzed @ 70C	over 48 hours
Catalyzed (1½% Benzoyl Peroxide) @ 25C	over 48 hours

K-20—Lubrication

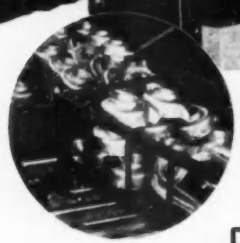
Lube-Lok, a bonded to metal lubrication process manufactured and licensed by the Electrofilm Corp., North Hollywood, Calif., is now being applied to Diesel liners.

K-21—Truck Heater

Introduction of a high capacity hot water, fresh air truck cab heater has (*Turn to page 72, please*)

ENGINEERED MP SERVICE PHILLIPS

POWER TOOL MANUFACTURER CLEANS CASTINGS, STAMPINGS, MACHINED PARTS, FASTER AND MORE THOROUGHLY WITH A PHILLIPS DEGREASER



Above: Metal parts are thoroughly cleaned in Phillips high efficiency Model 60 degreaser. Inset shows condition of parts after degreasing.

Skilsaw reports improved cleaning before painting and assembly.

HERE is another case illustrating the high cleaning efficiency of Phillips degreasers. Skilsaw, Inc., Chicago, uses a Phillips Model 60 electric batch-type machine to clean both aluminum and iron castings, steel stampings, shafts and screw machine parts. These parts must be thoroughly cleaned before painting and assembly of the finished product. Among the types of soil removed are coolants, kerosene, drawing oils, and just plain shop dirt.

Skilsaw reports that the Phillips unit cleans their parts better, as well as 3 to 4 times faster than their former method. Thus production is speeded up and better control is assured over the quality of the finished product.

Check into the time and money you can save with Phillips Vapor Degreasing. Our representative will be glad to discuss your parts cleaning problem with you.

SEND FOR YOUR COPY OF THIS NEW BULLETIN

Describes and illustrates Phillips engineered metal cleaning equipment.

Phillips 3465 TOUHY AVENUE • CHICAGO 45, ILLINOIS
MANUFACTURING COMPANY
ENGINEERED METAL CLEANING EQUIPMENT

BATCH TYPE DEGREASERS

COMBINATION DEGREASERS

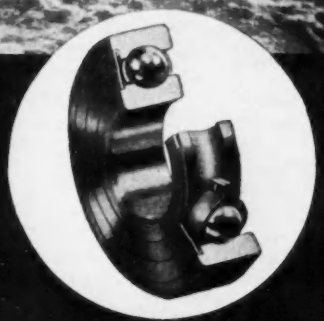
"ROTOMATIC" DEGREASERS

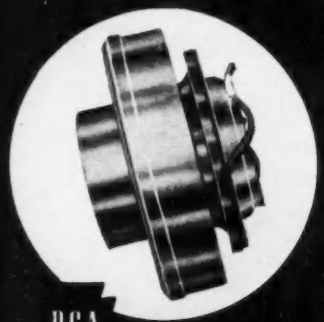
CONVEYOR TYPE DEGREASERS

"TORRENT" WASHERS

Wherever "Specs" call for DEPENDABILITY...

BCA BEARINGS are the standard





The U. S. Army Ordnance Corps' "Eager Beaver" is a truck that has weathered the worst — deep water, mud, heat, cold, dust, steep grades, rocky roads.

Built by Reo to specifications that are really tough, every part of these trucks was selected to withstand the most severe kind of beating. That's why BCA Bearings "or equal" were specified by the Spicer Division of Dana Corp., suppliers of the transmissions and clutches.

BCA Bearings are *performance proved*. They have an enviable record for dependability, economy and long-life . . . they are original equipment on many trucks, buses, cars and tractors . . . they are the *first choice* of design engineers with critical specifications.

Whatever your bearing requirements — transmission, clutch, differential, wheels, generators — specify the best . . . BCA Bearings.

BCA

BEARINGS COMPANY OF AMERICA
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Makers of a complete line of Ball Bearings for all makes of cars, trucks, buses and tractors.

MOTOR WHEEL CORPORATION

LANSING 3 MICHIGAN

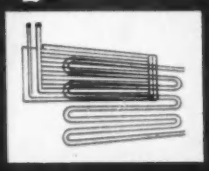
finds PLATECOILS more efficient – require 90% less cleaning

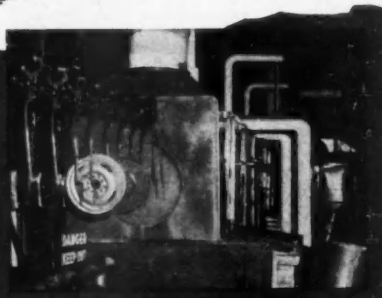
The advantages of Platecoils for tank heating and cooling make themselves felt in many ways. An example is the Motor Wheel Corporation, where Platecoils have replaced pipe coils for heating a bonderite washer. Mr. C. V. Lovell, Chief Draftsman, Maintenance Department, says Platecoils "are more efficient for the following reasons: "First, the scale formed by the solution does not adhere as readily to the smooth surface of the Platecoils and secondly, a large percentage of the scale that does collect is flaked off. Naturally this allows the Platecoil to be a better heat conductor . . ."

HOWEVER, THE GREATEST SAVING seems to be in the amount of time consumed in cleaning the coils. The pipe coils were cleaned every thirty days by the hammer and chisel method and required about five man hours per coil, including removal and replacement time.

The Platecoils are cleaned by brushing every sixty days and require about one man hour per coil including removal and replacement time.

In terms of dollars and cents this amounts to a saving of approximately $7.20 per coil per month . . .





Cleaned and Repaired Without Dumping Tank Solution
Greater BTU Transfer Per Unit Area
Weighs Only Half as Much as Pipe Coil
No Threaded Joints in Tank
Increased Tank Capacity
Fast, Easy Installation
Easy to Clean

PLATECOIL
Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

NEW PRODUCTS

For additional information please use coupon on page 62

(*Continued from page 70*)

been announced by the Evans Products Co., Plymouth, Mich.

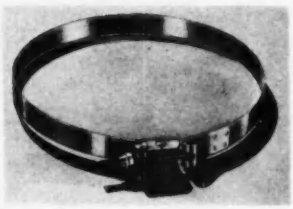
The heater-defroster was designed jointly by engineers of the White Motor Co. and Evans Products Co. for the series 3000 White trucks. It has an output of 25,000 BTU per hr.

A separate motor powers the built-in defroster unit. The fresh air supply is controlled by a multi-vane shutter. It has an air output of 72.2 cfm. at the windshield.

One of the features of the heater is the nine-in. Evanair fan. Blades and hub are die-cast of magnesium alloy in one-piece construction.

Other features of the heater are: Heavy-duty, self-bleeding core; brass tanks, headers and tubes. The heater motor is of continuous service design. There are three selective comfort-control doors in the baked enamel heater case. Another feature is the water control valve that governs the amount of water flowing through the heater core.

K-22—Stainless Clamp



A stainless steel clamp, known as the series 21 quick coupling clamp, has been brought out by the Specialty Products Company, Cleveland, Ohio. Featuring a hinged latch for assembly or removal, this clamp is especially designed for handling removable equipment. The clamp is claimed to be suitable for high temperature, pressure and corrosion resistance. It is further stated that the unit has a high strength-to-weight ratio.

K-23—Plastic Sealing Compound

For sealing gaskets and threaded joints of all types, Chicago Gasket Co., Chicago, Ill., has available a product, called Graycote. It is composed of six basic ingredients, the chief of which is a spongy metallic pigment in an insoluble vehicle. Retention in the non-drying vehicle keeps the compound soft,

(*Turn to page 76, please*)

Exide

THE FACTORY-FRESH LINE THAT FITS ALL BATTERY NEEDS

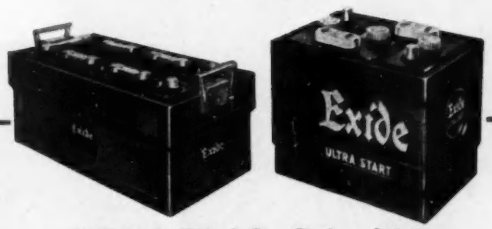
Whatever you make—if it's battery-equipped, there's an Exide for the job. Each Exide battery is a product of years of continuous development. Each is designed to meet specific needs—of gas or diesel engines, trucks of every size, automobiles, tractors, off-the-highway equipment, aircraft, motor boats.

When you equip with Exide batteries you can count on dependable starting in all climates, long battery life, low cost maintenance. You are assured prompt delivery of factory-fresh batteries from 16 manufacturing and assembly plants located throughout the country.

Exide engineers will be glad to work with you on any of your storage battery problems.

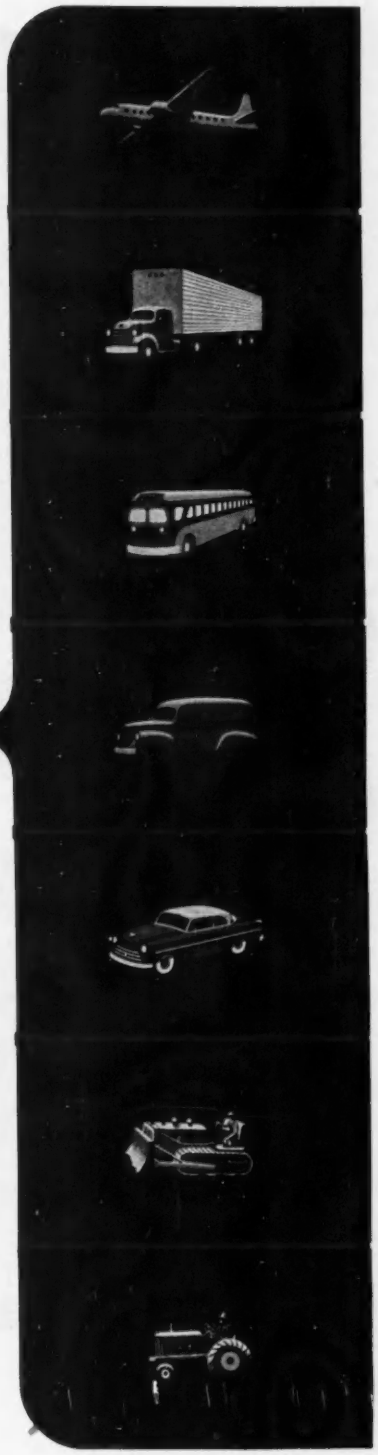
THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

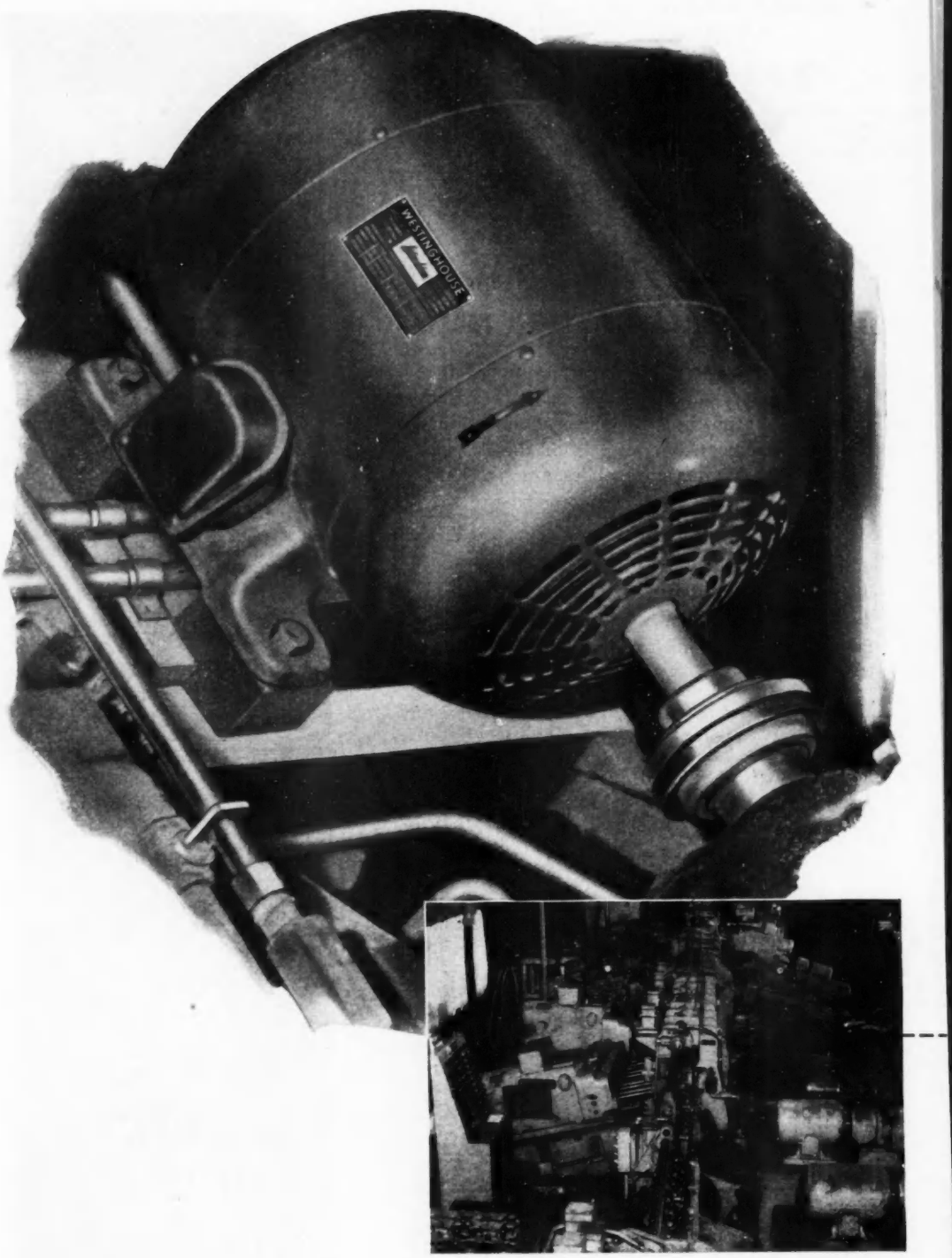
"Exide" *Reg. Trade-mark U. S. Pat. Off.*



STARTING POWER
for light, medium or heavy-duty service

1888...DEPENDABLE BATTERIES FOR 64 YEARS...1952





View of V-8 engine line, Studebaker plant, South Bend, Ind.

STUDEBAKER

chooses *Life-Line* motors for *dependability*

Studebaker V-8 engines get their start here. This machine, half a city block long, takes rough cast cylinder heads at one end, turns out completely machined and drilled finished ones at the other—at a rate of 150 finished cylinder heads per hour.

It's no accident that the motors that power this machine are Westinghouse Life-Lines. In fact, most motors that power the equipment at Studebaker are Westinghouse motors. This type of machine must meet one basic requirement—SHUTDOWN TIME IS OUT. One motor outage may cause the stoppage of the entire line. Thus, when motors were selected, Life-Lines were chosen because of their high degree of dependability.

This dependability is not based on any one feature. Rather, it is the sum of the parts—all based on advanced Westinghouse engineering. Pre-lubricated bearings, all-steel construction, superior insulation are typical of the factors that add up to the facts. You can't beat Life-Line performance. This dependability is yours at no extra cost.

Find out for yourself how Life-Line motors have solved problems for others. Send for a copy of "101 Life-Line Case Histories" B-4769. It's free. Your Westinghouse representative has one for you, or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Penna.

J-21658

YOU CAN BE SURE... IF IT'S
Westinghouse

Life-Line
MOTORS and CONTROLS

NEW PRODUCTS

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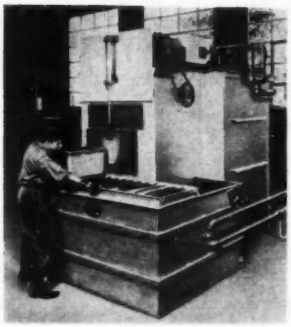
(*Continued from page 72*)

creating a permanent seal but allowing units to be easily disassembled after long periods of time even under high temperature conditions. Graycote also lubricates threads to reduce wrench torque and allow additional takeup.

Graycote is recommended for all oil, water, steam, gaseous fuel and refrigerant applications. It is ideal for sealing gasoline, distillates, LP gases and jet engine fuels. It may be widely used as a general-purpose sealing and anti-seize compound on mechanical equipment and in hydraulic units handling pressures up to 5000 psi.

K-24—Controlled Atmosphere Furnace

Dow Furnace Co., Detroit, Mich., had brought out a small, pitless batch-type controlled atmosphere furnace for production gas cyaniding, gas carburizing, clean hardening and carbon restoration. Called the model G, the small



Dow furnace, model G.

furnace is completely mechanized and self-contained.

In operation, the model G will heat 500 lb of work from room temperature to 1500 F. in one hour provided the furnace is stabilized at control temperature when the load is introduced, according to the company. Net loads up to a maximum of 600 lb of work can be processed although the net loads will naturally vary with the type of parts, temperatures and case depths.

Heating of the model G is accomplished by four radiant tubes fired with standard Dow burners piped to necessary control valves, etc.

A gas generator system of catalytic type is incorporated within the radiant tubes to supply a gas neutral to medium carbon steels. A claimed feature of the tube and generator system is that the generator gas can be analyzed before going into the furnace. A high volume fan combined with a fan inlet is used to direct the flow of atmosphere through the furnace load. Quenching is done directly from the furnace vestibule. The oil in the quench tank is circulated in a similar manner to the atmosphere.

The Dow model G covers an area approximately 6 1/3 ft wide by 12 ft long with a required head room of 14 ft. The roller rail hearth is 2 ft by 2 ft and holds one tray 24 in. by 24 in. carrying a container with a maximum depth of 12 in.

(*Turn to page 78, please*)

Expressly Designed for Modern Sealed Cooling Systems

Dole DV Thermostats, used in leading makes, have proved their ability to operate positively against high pump pressures. They offer this high efficiency also for cars and trucks with atmospheric systems. Thus, Dole DV's help all cooling systems to assure quick warm-up—with quicker heat from the car heater—and savings of gasoline, oil and motor wear.

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Control with Dole **DV Thermostats**

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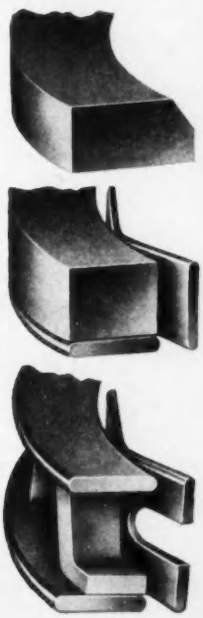
"Made for Each Other!"

SERVICE PISTON RING SETS BY MUSKEGON

Muskegon serves car manufacturers by working with them to design piston rings especially for their engines. By this close collaboration each ring and its companion rings, each set of rings and its corresponding engine are truly "made for each other" and will work smoothly together to produce top performance, mileage, and economy.

Muskegon offers car manufacturers *complete* service—not only design and engineering, but the most modern facilities for the casting, processing, finishing, inspection, and packaging of Service Piston Ring Sets.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available only through car dealers and other authorized service outlets.



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Piston Rings

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PLANTS AT MUSKEGON AND SPARTA

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THESE FACTORS COMBINE TO MAKE THE FINEST STEEL BALLS OBTAINABLE BECAUSE THEY CONTRIBUTE TO CLOSER SURFACE UNIFORMITY—BETTER STRAIN DISTRIBUTION—HIGHER LOAD CARRYING CAPACITY—LONGER LIFE
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IMPORTANT APPLICATIONS
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NEW PRODUCTS

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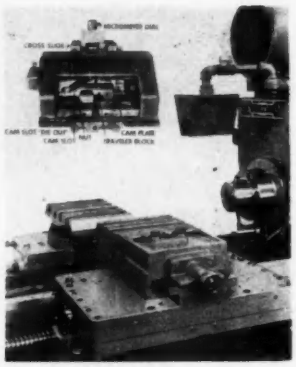
(*Continued from page* 76)

K-25—Rear Cross Slide

A cam-operated rear cross slide on the duomatic lathe offers increased rigidity for forming, grooving, necking and similar operations, according to the manufacturer, The Lodge & Shipley Co., Cincinnati, Ohio. Significant production increases are claimed for the new arrangement which replaces the former rack and pinion slide.



Lodge & Shipley cam operated rear cross slide.

The cam, which feeds the slide into the workpiece, has been so constructed to move the slide inward at a constant rate. When the tools reach the end of the stroke, the inward feed dies out in the cam slot. Thus, the cam itself determines diametral accuracy.

K-26—Barrel Finishing Compound

A special purpose chemical compound for barrel finishing alloy steel parts is being offered under the tradename Blue Magic steel finishing compound no. C-5. The manufacturer, Blue Magic Chemical Specialties Co., Philadelphia, Pa., states that with C-5 compound, and any generally used tumbling medium, bright finishes can be put on steel parts in time cycles of 20 to 40 min. Also that the compound can be used in certain applications for both roughing and finishing to produce

(*Turn to page* 80, *please*)

LISTEN to the difference

This Clearing press at Vollrath is making flywheel fans for lawnmower engines.

It may be strange to think of a metal-forming press as QUIET in operation, but that's what The Vollrath Company of Sheboygan, Wisconsin, think about their Clearings in comparison to their other presses. Since this company has been making the famous Vollrath Ware since 1874, you can be sure they know presses, and are putting proper value on an important consideration.

Their Clearing presses require definitely less maintenance than their other, less quiet presses. That, of course, is the payoff. The Vollrath people know that noisy operation means strain and wear—and ultimate cost. That's why they buy Clearings.

When you buy or specify a press, we suggest you listen to the difference. It's a good way to save money.

CLEARING MACHINE CORPORATION
6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 62

(*Continued from page* 78)

low micro inch surface readings, true color and uniform results.

Blue Magic compound no. C-5 is a non-dusting, soapy, concentrated powder and is not irritating to the skin. It is said that detergency and rinsibility are outstanding characteristics and that parts leave the tumbling barrel free from chips, abrasives, oil traces or any other foreign matter.

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AUTO LAMPS®
Engineered to make America's Cars the World's best lighted
A COMPLETE LINE
for every car, truck and bus on the road.
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The instrument panel pilot light feature is an outstanding contribution to highway safety.
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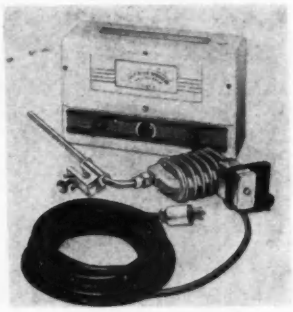
K-27—Combustion Analyzer

The Allen Electric and Equipment Co., Kalamazoo, Mich., has announced the development of a heavy-duty combustion analyzer, identified as model E-806, which is recommended for use in dynamometer tests.

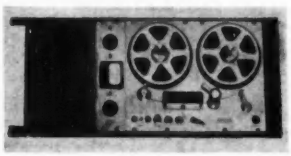
For use on all types of gasoline and butane-propane engines, including trucks, tractors, and buses, the E-806 is equipped with heavy-duty tail pipe unit with large cooling fins and built-in water trap. An electrical connection is used between the tail pipe element and the analyzer unit. According to the manufacturer, this feature greatly reduces the time required for changes in the gas to register on the meter scale.



Allen combustion analyzer, E-806.

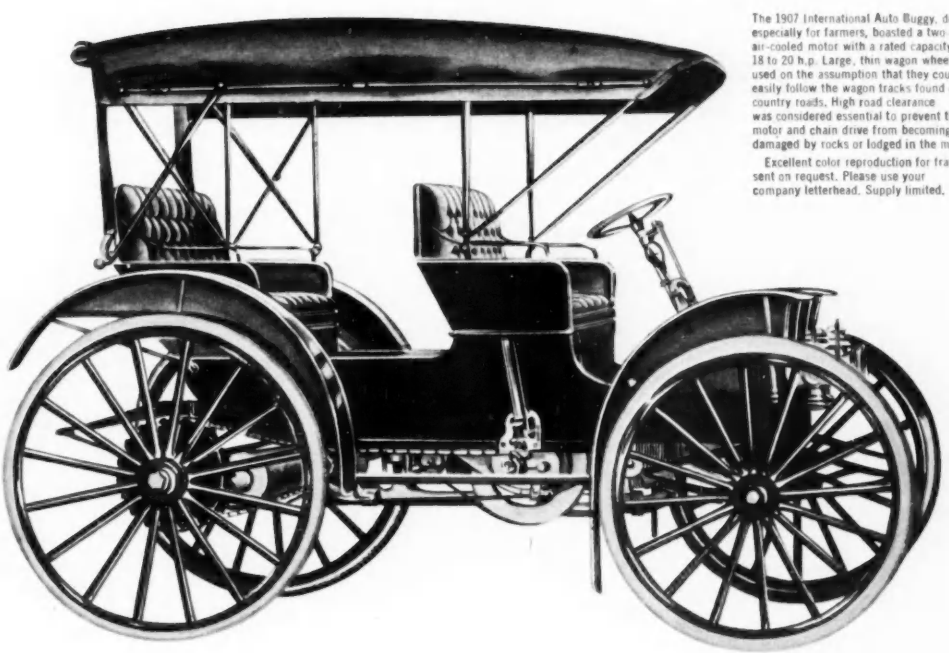
K-28—Tape Recorder

A magnetic tape recorder, especially designed for recording signals telemetered from aircraft and missiles, has been brought out by the Ampex Electric Corp., Redwood City, Calif. This recorder, known as model 307, is the second of a line of special recorders designed for recording original telemetered data. The unit has a frequency range of from 100 to 100,000 cps, thereby permitting the recording of all FM/FM telemetering channels recommended by the Telemetering Panel of Research and Development Board.



Ampex telemeter recorder, model 307.

It is designed for three tape speeds: 60 ips in addition to the usual 30 and 15 ips. The major applications will be in the recording of FM signals which contain measurement data made on aircraft or missiles during flight which must be recorded on the ground.



The 1907 International Auto Buggy, designed especially for farmers, boasted a two-cylinder air-cooled motor with a rated capacity of 18 to 20 h.p. Large, thin wagon wheels were used on the assumption that they could easily follow the wagon tracks found on country roads. High road clearance was considered essential to prevent the motor and chain drive from becoming damaged by rocks or lodged in the mud.

Excellent color reproduction for framing sent on request. Please use your company letterhead. Supply limited.

"Leave your plow horse in the fields Drive an International with the big red wheels"

"A farmer with foresight enough to purchase an International Auto Buggy will no longer find it necessary to use plow horses for travel when they should be working in the fields.

"The annoying gait of a tired horse; the danger of a runaway; the frequent delays for feeding and resting . . . these are bygone annoyances for those who own an International Auto Buggy."

. . . this was the down-to-earth, straightforward sales approach used by International Harvester Company away back in 1907 . . . and these were the big red wheels that flashed merrily along many a country road, signaling, if you will, the approach of today's fleet of powerful International trucks.

American truck manufacturers, including International, now use far more than red wheels to catch the eye. Today's giant trucks are finished in bright, bold colors and combination of colors . . . to help promote the truck transportation industry.

Many leading truck and passenger car manufacturers, as well as fleet operators, use highly durable R-M enamels, lacquers and undercoats on production lines and for refinishing operations.

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"Proudly the automotive world displays the lustrous beauty of R-M Lacquers"

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Specify *American* Broaches

For the best results use American broaches —whether you broach keyways or drive gears.

BROACHING MOTOR COUPLINGS WITH AN AMERICAN STANDARD KEYWAY BROACH

A simple operation yet requiring accuracy is the production broaching of keyways in motor couplings.

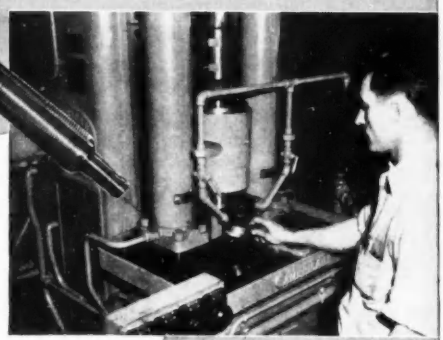
In this tooling set up the operator is not required to remove the American keyway broach from the pull head as he threads the part over the broach onto a work horn. High production is obtained as a part is loaded on each return stroke.

Whether your problem is keyways or complicated involute splines, American broach engineers can design the proper broach to produce parts to your requirements.

FINISH BROACHING AUTOMATIC TRANSMISSION DRIVE GEARS

The prime requirement of automatic gears is silence in operation and long life. American broaches are used to finish the drive gear's helical involute teeth on the American machine shown to the right. No further internal machining is necessary on these gears which must pass rigid tests before final assembly.

Let American quote on your broaching requirements — machines, broaches and fixtures. Send a part print and full information.



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Over 5,000 copies of Catalog 450 have been distributed . . . get your copy now of this informative data book on American Broaches. Photographs . . . drawings . . . charts and case histories of broaching tools. Write today for your copy!

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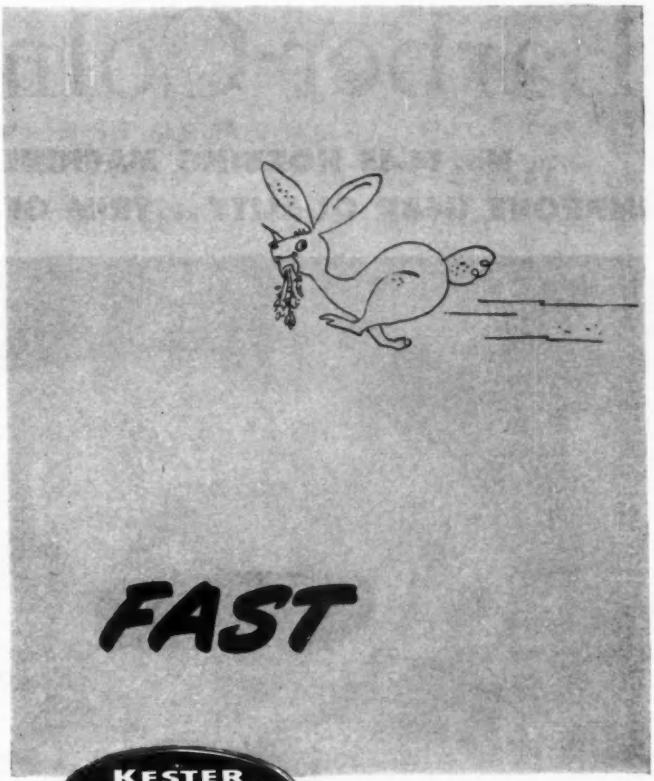
CALENDAR

OF COMING SHOWS AND MEETINGS

Society of Plastics Engineers, Inc. (eighth annual technical conference), Chicago, Ill. .....Jan. 16-18
Brussels Automobile & Truck Show, Brussels, Belgium .....Jan. 19-30
Truck-Trailer Manufacturers Association (11th annual meeting), Houston, Texas .....Jan. 28-30
American Society for Metals Midwinter technical meeting, Pittsburgh, Pa. .....Jan. 31-Feb. 1
19th Chicago National Boat Show, Chicago, Ill. .....Feb. 1-10
Automotive Accessories Manufacturers of America Exposition, New York, N. Y. .....Feb. 4-7
Chicago Automobile Show, Chicago, Ill. .....Feb. 16-24
National Transport Vehicle Show & Fleet Maintenance Exposition, New York .....Feb. 26-28
Pacific Automotive Show, Los Angeles, Calif. .....Feb. 28-Mar. 2
Amsterdam Automobile Show, Amsterdam, Netherlands ..Feb. 29-Mar. 10
ASTM Spring Meeting, Cleveland, Ohio .....Mar. 3-7
SAE Passenger Car, Body and Materials Meetings, Detroit, Mich. ..Mar. 4-6
Fifth National Plastics Exposition, Phila., Pa. .....Mar. 11-14
ASTE Industrial Exposition, Chicago, Ill. .....Mar. 17-21
Geneva Automobile & Truck Show, Geneva, Switzerland .....Mar. 20-30
First Annual American Power Conference, Chicago, Ill. .....Mar. 26-28
American Society of Lubrication Engineers, Seventh Annual Meeting and Lubrication Show, Cleveland, Ohio .....Apr. 7, 8, 9
SAE Aeronautic Meeting, New York, N. Y. .....Apr. 21-24
Turin Automobile Show, Turin, Italy .....Apr. 23-May 4
International Foundry Congress and Show, Atlantic City, N. J. ...May 1-7
API Div. of Refining, San Francisco, Calif. .....May 12-15
American Society for Quality Control (sixth annual meeting), Syracuse, N. Y. .....May 22-24
Memorial Day 500 Mile Race, Indianapolis, Ind. .....May 30
SAE Summer Meeting, Atlantic City, N. J. .....June 1-6
Industrial Finishing Exposition, Chicago, Ill. .....June 16-20
American Society for Testing Materials (annual meeting), New York City .....June 23-27
SAE West Coast Meeting, San Francisco, Calif. .....Aug. 11-13
American Standards Asso., Third National Standardization Conference, Chicago, Ill. .....Sept. 8-10
Instrument Society of America (sixth annual meeting), Cleveland, Ohio .....Sept. 8-12
SAE Tractor Meeting, Milwaukee, Wis. .....Sept. 9-11
Paris Automobile Show, Paris, France .....Oct. 2-12
37th International Motor Exhibition, London, England .....Oct. 15-22



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FAST In Soldering Action
FAST In Obtaining Wanted Results

Kester can give you the exact percentage of flux content needed for your particular soldering operation. Only Kester has the proven ability to exercise this *flux control!*

Kester also has the greatest selection of Flux-Core Solders . . . Acid, "A", Nosput, Knorust, Plastic Rosin, "Resin-Five", "44" Resin and others in a wide range of diameters and impurity free alloys.

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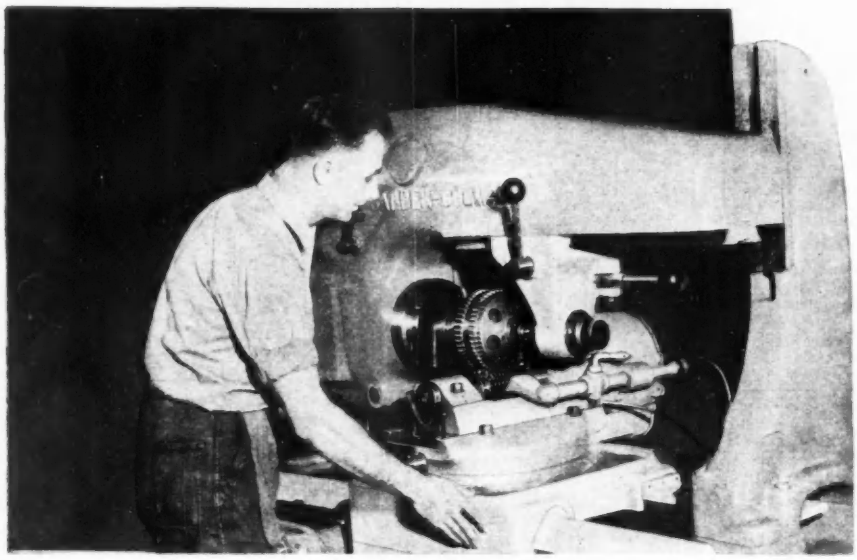
KESTER SOLDER

Barber-Colman

No. 14-15 HOBBING MACHINES IMPROVE GEAR QUALITY...TRIM GEAR COSTS

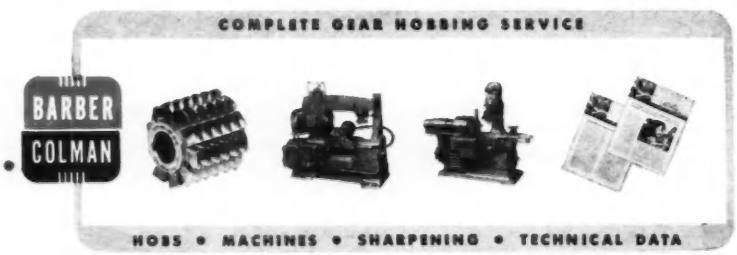


Tooth Profile Checks Within .0003″

Two outstanding features of the No. 14-15 Hobbing Machine provide exceptional gear cutting accuracy. A built-in differential permits successive roughing and finishing cuts without removing or aligning the work. A precision index worm gear, 18⅝″ in diameter, guarantees spacing accuracy within "tenths".

The 7 pitch transmission gears shown here are hobbed 2 per load in 17 minutes. Ground class A hobs, 3⅝″ diameter, are used at 129 rpm. and .090″ feed. Gears have 48 teeth, 11/16″ face and 7.139″ diameter. Average involute check is within .0003″. Average adjacent tooth spacing check is within .0005″.

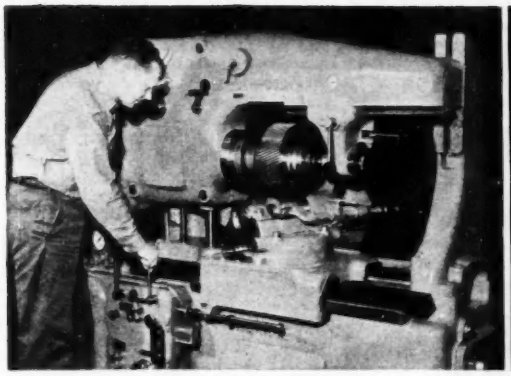
This machine accuracy in hobbing is especially important because tooth spacing errors cannot be economically removed by any known finishing operations.



Machines, like athletes, should be replaced when a substitute can do a better job — not when complete exhaustion forces removal from the field of play.

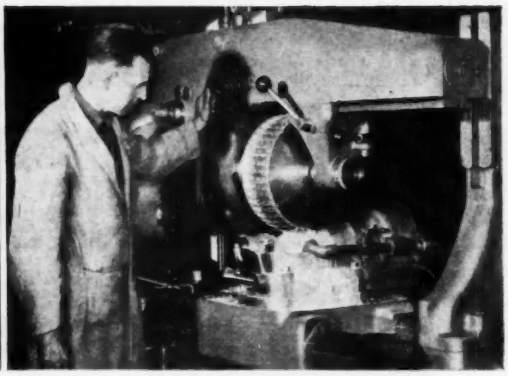
BUILDERS OF PRECISION GEAR

FINISH — HOB HEAVY CUTS IN ONE PASS
CUT HOBBING TIME PER GEAR 1/3 OR BETTER
HOLD LIMITS OF .0005" ON TOOTH SPACING AND PROFILE



Hobbing Time Cut From 33 to 13 Minutes Per Gear
This job shows *Multithread* hobs climb cutting 8 pitch, 11½" diameter helical gears in 13 minutes, compared with former time of 33 minutes. Hobs are 5½" diameter. Hob speed is 60 RPM. Feed of .060" per work revolution is used.

The rigidity and power of the No. 14-15 Machine furnishes ideal conditions for the application of large diameter *Multithread* hobs. The increase in the number of hob threads, large hob diameter, and fast work indexing combine to cut time per gear by nearly ⅓.



Finish-Hob ⅝" Roller Chain Sprockets In A Single Cut
These roller chain sprockets are an example of heavy, one-cut finish hobbing on No. 14-15 Machines. Sprockets are 15.179" diameter and are hobbed 8 per load in 35 minutes. Hob speed of 77 RPM and feed of .20" per minute are used.

Tremendous rigidity, power and weight of the No. 14-15 Machine prevent machine deflection and vibration, making possible such heavy cuts in one pass. This extra ruggedness furnishes single-cut capacity for spur and helical gears as coarse as 3½ pitch in some sizes.

● High output, heavy-cut finishing and extreme accuracy are obtained under normal operating conditions with the No. 14-15 Hobbing Machine. Because of these advantages and the rigidity to meet continuous high production schedules, many gear departments are substituting No. 14-15's for present equipment.

The machine cuts spur and helical gears up to 14" diameter, and as coarse as 3½ pitch in some sizes, as well as spline shafts, sprockets and other hobbed forms. It is widely used for hobbing automotive flywheel ring gears, transmission gears and shafts, rear axle shafts, drive sprockets and steering clutch hubs. You, too, can improve your gear quality and reduce costs by hobbing on the No. 14-15 Hobbing Machine.

Get the Complete Story . . .
A new bulletin describes the range, capacity, output and extreme accuracy of the No. 14-15 Hobbing Machine. We'll be glad to send a copy without obligation. Ask for Bulletin No. 123.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 101 ROCK STREET, ROCKFORD, ILLINOIS, U. S. A.

HOBS AND MACHINES SINCE 1911

Test Results With Dual Fuel Carburetion

(*Continued from page* 50)

carburetor (using a high octane gasoline, premium-ethanol blend, 100 per cent ethanol and 100 per cent methanol) and the standard Rochester carburetor (with iso-octane) are shown on Fig. 5. Within the limits of test accuracy, the power and specific fuel consumption (lb fuel per hp-hr) are about equal for both the dual-fuel and standard carburetor with high octane gasolines, although acceleration tests showed slightly faster acceleration with standard carburetor using iso-octane as compared with dual-fuel carburetor using high octane or gasoline-ethanol blends. There was a noticeable increase in power with 100 per cent ethanol or 100 per cent methanol but the specific fuel consumption was naturally higher due to the lower heating value per lb for ethanol and methanol and richer F/A ratio required.

Part throttle specific fuel consumption data plotted vs. rear wheel horsepower at 2000 rpm is shown in Figs. 6 and 7. Fig. 6 compares the two carburetors. Above 50-55 hp (7 in. Hg. manifold vacuum) the enrichment jet cuts in for the standard carburetor and results in an increase in specific fuel consumption. The change-over from L.O. to H.O. on the specific fuel consumption curve for the dual-fuel carburetor occurs at different horsepower readings depending upon the manifold vacuum setting of the vacuum diaphragm assembly. On the curve shown, this setting was 7½ in. Hg. (about 50-52 hp). There was a slight increase in specific fuel consumption at the blending point from L.O. to H.O. The L.O. metering rods (part-throttle) of the dual-fuel carburetor apparently give a sligthly leaner F/A ratio as compared with the same part throttle range using the standard carburetor resulting in slightly decreased specific fuel consumption. The difference as plotted is barely more than the accuracy of the dynamometer tests, however. Fig. 7 compares specific fuel consumption as obtained with various H.O. fuels while using the same premium as L.O. fuel.

The downward slant of the specific fuel consumption curve for 100 per cent methanol is due to the progressively leaner A/F ratio (from approximately 6 to 1 to 6½ to 1) as full throttle is approached. As explained previously, this leaner ratio was caused by the metering rod-jet combination which limited fuel flow at full throttle.

Road consumption and acceleration data are given in Table 5. The lower mpg figures are all accounted for when the lower heats of combustions per gal of those fuels are considered. As shown on Table 4 the heat of combustion of iso-octane is somewhat less than that of "gasolines" while those of the two alcohols are considerably lower. The results for over-all average mpg of total fuel and for consumption ratio of H.O. to L.O. when using the dual fuel carburetor are most favorable. Instead of requiring the use of all 100-octane, or better, gasoline in a more efficient high compression engine, the dual-fuel carburetor allows the larger percentage of fuel consumed to be a commercial (and lower cost) premium grade gasoline. The use of alcohol or an alcohol-premium gasoline blend makes available an additional source of high octane fuel.

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(1) "Progress Report on the Dual-Fuel System" SAE Preprint, SAE Summer Meeting, June 6-11, 1948. Also, "Automatic Dual-Fuel System Saves High Octane Gasoline," Automotive Industries Feb. 1, 1948.

(2) "Evaluation of Motor Fuels for High Compression Engines," Automotive Industries, Nov. 1, 1950

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= your product designers' know-how + ROCKFORD clutch engineering experience
If our quarter century of clutch engineering experience can help make your power transmission designing and specifying job easier, we urge you to consult ROCKFORD engineers freely. They are continually helping design engineers to solve operation efficiency, dependability and economy problems—in thousands of different kinds of machines—thru proper application of ROCKFORD clutches, power take-offs and speed reducers.
B|W

ROCKFORD CLUTCH DIVISION
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ROCKFORD CLUTCHES

When the earliest oxcart creaked and groaned its way in man's most ancient effort at wheel transportation, the driver who shouted the primitive equivalent of "gee" and "haw" had the benefit of power steering. For, he only guided the oxen with his voice or whip—the animals supplied the power for turning.

These days about all we see of the ox is the hamburg in the corner joint, but in taking the animal out of transportation we have loaded part of its work on the drivers of trucks and other vehicles. In trucks without power steering, the driver's muscles have to supply the turning effort. The power must come from his arms, shoulders and back.

Is it progress when we build vehicles that require more physical effort to steer than oxcarts? No wonder drivers tire and become less efficient—lose the fresh alertness that assures safety.

Vickers Hydraulic Power Steering is much better than the ox because you don't have to yell at it or beat it. It takes the work out of steering . . . requires little more effort than a wave of the hand. Wheeling a truck around is so much less tiresome that the driver remains fresh, efficient, safe. For further information, ask for Bulletin M-5100.

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ONE SET OF FLANGES
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STANDARD CLAMPS FOR SPECIAL APPLICATIONS

Aluminum Industry

(*Continued from page* 53)

not power shortages in the northwest and southeast curtailed production in the plants in those areas during the late summer. By the close of the year, the industry was producing about 5,000,000 lb of primary metal a day—a rate that has been exceeded only during 1943, the peak production year of World War II.

Increases in primary aluminum annual capacity so far scheduled since the outbreak of hostilities in Korea total approximately 1,500,000,000 lb. About 1,100,000,000 lb of this expansion will be in new plants and 400,000,000 lb in existing plants.

Approximately 300,000,000 lb of the 1,500,000,000 lb total was in operation by the end of 1951. An additional 800,000,000 lb is scheduled to begin production during 1952, and the remaining 400,000,000 lb in 1953. When all of the new facilities are in operation, the industry will have double the primary capacity it had at the close of 1950, or a grand total of about 3,000,000,000 lb.

Most of the 300,000,000 lb capacity increase placed in operation during 1951 was in existing plants. Included in this total is 158,000,000 lb in previously idle equipment for which economical electric power was not available.

Six new reduction plants are included in the expansion program. Two will be in the northwest, where hydroelectric power is available. The other four will be in the south, three of which will have power plants using natural gas. One plant will obtain its power supply from lignite, a fuel not heretofore employed for the production of aluminum. Four of the six plants were under construction at the close of 1951. Five of the six new plants are being built by existing producers and one by a newcomer.

The production of aluminum, of course, cannot be increased by building new reduction plants alone. There must be expanded ore and ore-refining facilities as well. New bauxite mining operations are being developed by two producers on the island of Jamaica. Output of the mines in Arkansas and in Surinam, South America, will be stepped up as required. To increase its ore-refining capacity, the industry is building two new alumina plants and is expanding the capacity of some of the existing alumina plants. Some new fabricating equipment is being added to boost the output of certain aluminum products, but by and large the industry's existing fabricating facilities are ample to handle the increased production.

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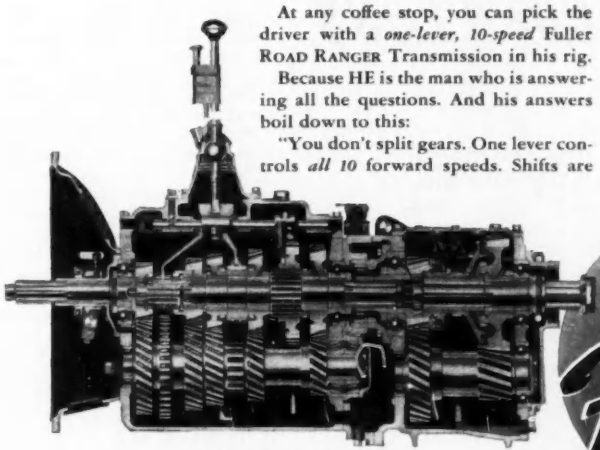

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Saginaw Hydraulic Steering Gear

(*Continued from page* 51)

fort on the steering wheel rim.

The mechanism is capable of factory calibration, for any given application, to meet a variety of steering effort requirements. Thus, manual steering can be calibrated within a desired range of effort on the wheel of three or four lb or more, while the maximum effort on the wheel for power steering can be similarly effected. On current passenger cars, the manual effort is held within three to four lb while maximum effort with power is held to seven to nine lb.

The booster system consists of a pump capable of delivering oil at a pressure of 750 psi, an oil reservoir, a double-acting hydraulic cylinder, and a control valve. The control valve consists of a cylindrical spool with two anual grooves. It is carefully machined and ground to a sliding fit within the bore of the valve housing, the bore, in turn, having three concave grooves properly located with respect to the grooves in the spool. In what may be termed a neutral position of the valve, as shown in the schematic illustration, oil from the pump can circulate freely throughout the system at practically zero pressure. However, if the valve spool is moved to the right (in the illustration), some of the passages within the valve housing are closed off and oil from the pump is directed to the left-hand end of the cylinder, forcing the piston and piston rod to the right. At the same time, oil from the right-hand end of the cylinder is allowed to return to the reservoir. The reverse of these conditions obtains when the valve spool is moved to the left.

With any given pump and cylinder, therefore, the speed of travel, force developed, and direction of travel of the piston rod, all are subject to complete control simply by moving the valve spool by varying amounts and direction.

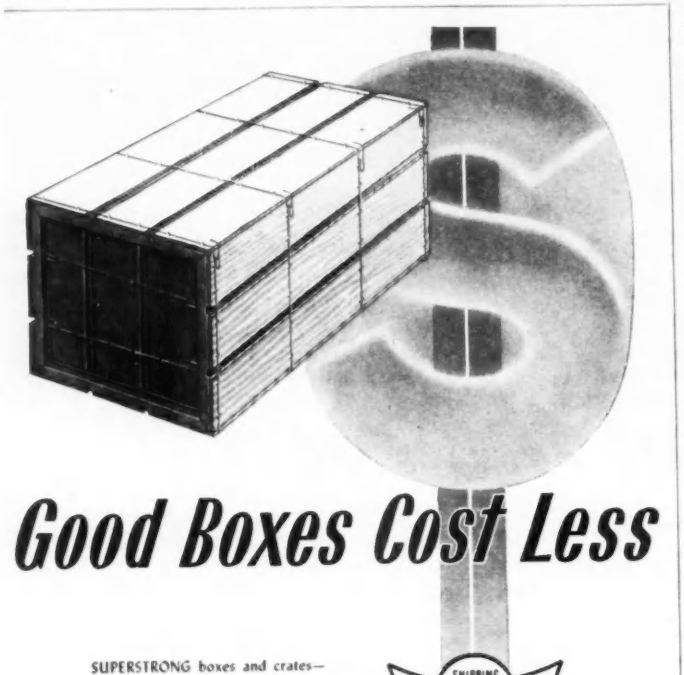
The valve spool is, in effect, an integral part of the worm and shaft assembly. It is mounted on ball thrust bearings to limit movement as well as to take thrust. In addition to the valve spool, there are five sets of spring-loaded plungers arranged circumferentially around the valve housing with their outer ends against the steering gear housing and thrust bearings, while the inner ends are connected to the central oil groove.

Another feature is the by-pass valve, designed to assure easy steering in the event of pump failure. This valve is built into the main control valve.

The five sets of springs, mentioned above, are compressed or preloaded to a total load of about 300 lb. The ball-bearing screw and nut is, in effect, an efficient jack, requiring only from three to four lb effort at the steering wheel to overcome the 300 lb preload. Until this point is reached, there is no power boost and the car steers normally as for example on a straightaway.

In addition to assisting the driver in steering the car, or turning the wheel with the car standing still, the whole system also acts in reverse movement. For example, if a shock load exceeding the 300-lb spring setting were encountered, movement of the valve would admit high pressure oil to the proper side of the hydraulic cylinder to resist the shock. Thus the driver is automatically relieved of most road shock, even under extremely severe conditions.

It may be noted that total valve movement for extreme maneuvers is only about 0.060 in.



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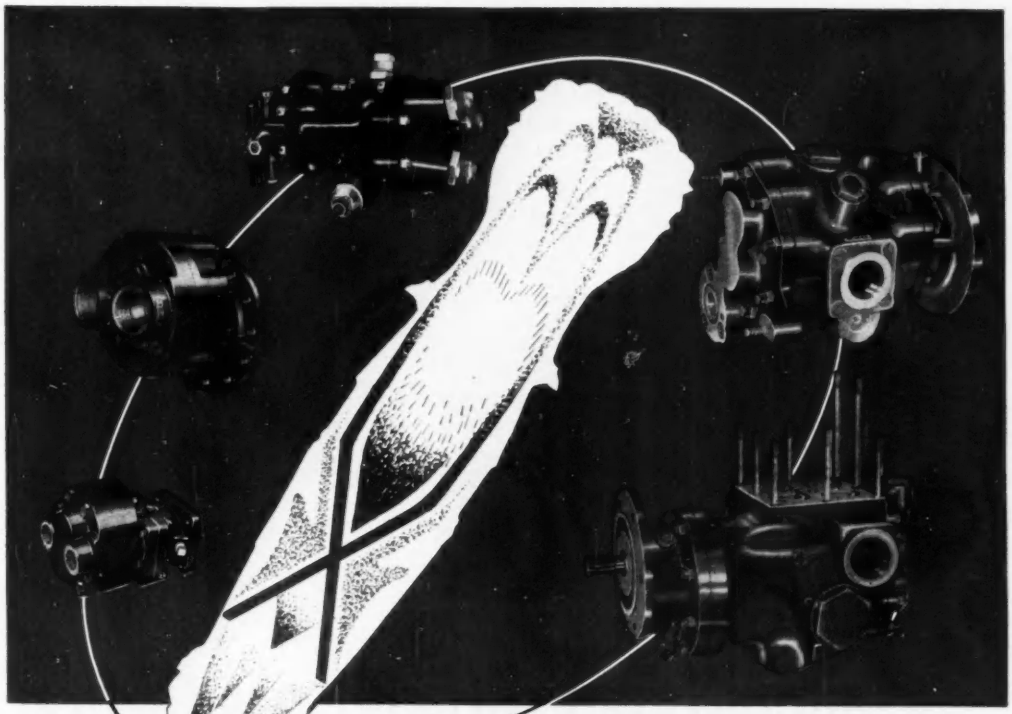

EVERY American Jet engine flying today is equipped with PESCO Fuel Pumps

Ever since the emergency call came in 1941 for a failure-proof fuel pump that would stand up and deliver fuel to jet engines under conditions never before encountered, Pesco has paced the industry in the development of high-pressure fuel pumps.

Pesco designed and built the first fuel pump for the first American-built jet engine, and since then new models have come from Pesco engineering laboratories in rapid succession to meet the fast-changing and exacting demands of the military.

Today, every American jet engine in the air is equipped with Pesco fuel pumps. A few representative models are shown above. They range from the first simple, single element pump that produced 275 gph at 100 psi, to today's double element (main and emergency pump in a single housing) pump that delivers nearly 2000 gph at 1200 psi.

Setting the pace for jet engine fuel pump development is only one of Pesco's important contributions to safer, faster, more dependable aircraft. It is experience that can be of real help to you.

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● **150 Ton Triple-Action Hydraulic Press,** which can be used as a single, double or triple action unit. Shown here it is drawing a long truncated cone for turbo-jet aircraft engines. This part produced in a single draw is one of the most exacting metal forming jobs performed by industry today.

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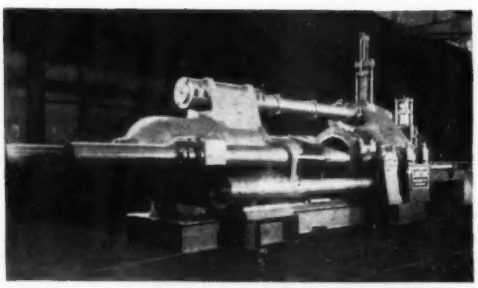

● **1500 Ton Lake Erie Hydraulic Press** for the extrusion of non-ferrous metals. This horizontal type extrusion press is available in capacities from 300 to 5000 tons. These presses are noted for their ability to hold close tolerances at high production speeds.

★ **LAKE ERIE HYDRAULIC PRESSES** have answered production problems for these and other Aircraft manufacturers.

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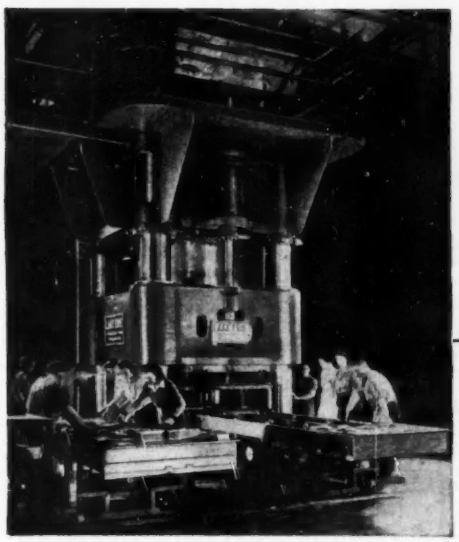
● **750 Ton Lake Erie Double Action Hydraulic Press,** shown here is an unusual application, forming large cowl rings with inexpensive wooden dies. This extremely versatile 4-column press can be furnished in many standard sizes or built to your specifications.

● **1000 Ton Lake Erie Hydraulic Press.** This high speed fully automatic press of welded band construction is being supplied in large numbers for the production of jet engine blades.

● **1000 Ton Double Action Presses** of rugged side housing design are equipped with two 125 ton hydro-pneumatic cushions. Shown forming bomber parts, these presses have beds 120″x64″.

problems in the Aircraft Industry



● **5000 Ton Lake Erie Forming Press** equipped with rubber pad. Available in capacities from 500 to 7000 tons producing up to 2000 p.s.i. on the work. High speed hydraulically operated loading tables or electrically operated tables (as shown above) are available for all press sizes.

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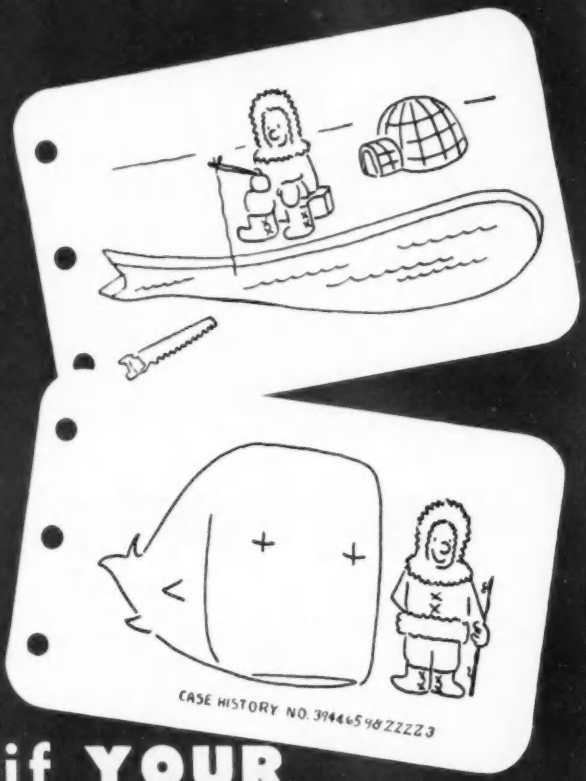

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1952 Buick

(*Continued from page 45*)

combination of two dual carburetors in an integral unit. The front, or primary carburetor, serves the same function and embodies the same features as does the conventional dual carburetor. The rear carburetor section serves only as a power booster. It has a non-adjustable idle system and a main metering system for wide open throttle operation. The secondary throttle is actuated by the primary throttle lever by means of a link and pick-up lever.

Each section of the carburetor has a separate float chamber with two interconnected floats actuating a float needle in each chamber. One gasoline inlet feeds both chambers through a channel in the float chamber cover.

Referring to the illustration, above the main throttle valve C in the secondary carburetor is an auxiliary throttle valve D which is allowed to function when it is unlocked and the main throttle valve is opened. Valve D is an unbalanced valve held shut by means of a weighted lever. It controls the air and fuel flow through the secondary carburetor according to engine requirements and functions only after the main throttle valve has opened.

In the four cut-away views, the throttle valve positions, choke valve positions, and auxiliary throttle valve locking linkage are illustrated for four engine conditions. For the cold engine, the choke valve A, primary throttle valve B, secondary throttle valve C, and auxiliary throttle valve D are all closed. When the choke valve A closes, a connecting lever locks the auxiliary throttle valve D in the closed position.

During warm up the choke valve is partially opened, but not far enough to release the locking linkage to the auxiliary throttle valve. Although the secondary throttle valve can open, the secondary carburetor does not function since the auxiliary throttle valve is closed and locked.

For part throttle operations, when the choke valve is fully opened, the auxiliary throttle valve is unlocked, and the secondary carburetor is ready to function according to engine requirements. However, if the car is cruising at low speed and the accelerator is pressed down suddenly, the counterbalanced auxiliary valve keeps the secondary carburetor from functioning until the speed has reached a point where the engine can burn the additional fuel charge fed into it.

During part throttle operation, up to 80 mph, the fuel and air supply is metered by the primary carburetor only. When the primary throttle is about one-half open (about 80 mph) a pick-up lever engages a loose lever on the shaft and by means of a link and lever starts to open the secondary

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carburetor. The geometry of the linkage is such that the opening rate of the secondary is about twice that of the primary, so that when the primary is wide open, the secondary also is wide open. The reason for having a metering system in the secondary which will deliver only a full power mixture, is that above 80 mph it is not possible to run on the lean mixture used at the lower speeds.

The idle system in the secondary carburetor delivers a portion of the fuel required when the engine idles. At high speeds, on part throttle, it assists in bringing in the secondary carburetor smoothly. No lean spot develops before the main metering system starts to function. At lower speeds, on part throttle, the idle system in the secondary also delivers nearly the same amount of fuel as it does at idle. This helps to maintain the correct fuel level in the secondary bowl by using fuel faster than the normal "creep" in level caused by vibration of the float mechanism.

By having the primary and secondary throttle close together, it is possible to adjust mixture quality at idle on the primary unit, with a fixed fuel discharge on the secondary, and still affect all cylinders on each manifold branch equally.

By using only the primary carburetor on part throttle operation, a slight gain to fuel economy is said to be possible since the higher velocity through a smaller carburetor usually permits more accurate fuel metering. Essentially it is not different from "economy set ups" used by various manufacturers which, among other things, also include the use of a pinched down carburetor.

The carburetor is vented internally in the air horn with the vents so located and shaped that metering is not affected by changes in air cleaner restriction. It can be run without an air cleaner and still maintain correct metering.

An improved type of combination fuel and vacuum pump developed by AC Spark Plug division of General Motors is featured on the new models. The vacuum side of the pump has been changed from a single acting type to a double acting type by use of an additional set of valves in the chamber between the diaphragm and the body, also on oil seal which is assembled around the operating pull rod. This makes this side of the diaphragm an effective pumping unit.

The two pumping chambers are connected by a common inlet port so that they operate in parallel. Outlet ports do not have a common discharge. The outlet on the cover side is connected to the inlet manifold which assists the pump when manifold vacuum is high. It also reduces the pump travel when manifold vacuum is high and the wiper is not in use. The outlet valve on the body side discharges back into the pump body and from there into the engine crankcase. This has two advantages; it discharges any crankcase oil which may seep by the seal back into the crankcase, and also gives a small amount of crankcase ventilation. The pumping operation is staggered, that is, one side is on the discharge stroke when the opposite side has its suction stroke. This reduces the fluctuation in vacuum and gives smoother wiper action at low speed.

A further AC improvement in the vacuum cover is the use of pressed-in tubes in place of the conventional tapped holes in the casting and screw-in fittings. The connections are made by push-on rubber hose which reduces the time required to connect up the tubing when the pump is assembled to the engine.

Power steering, now available at extra cost on Roadmaster models, is provided by the installation of a hydraulically-actuated steering gear supplied by the Saginaw Steering Gear Div., GMC. Design and operating features of this mechanism are described separately in this issue.

The hydraulic pump, supplying the pressure for operating the servo mechanism, is mounted on the left side of the engine in front, and is driven by a narrow V-belt from the crankshaft.

Although the steering gear ratio re-

Lamb Electric

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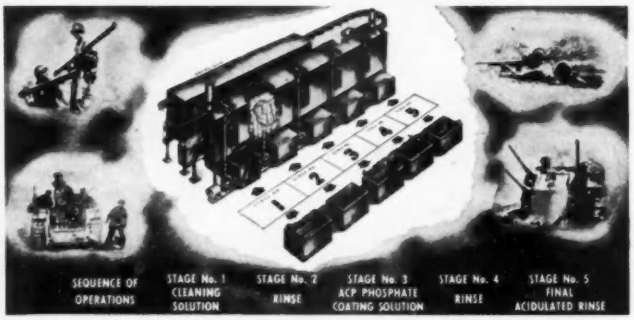
AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet
Subject: METAL PRESERVATION AND PAINT PROTECTION WITH ACP PHOSPHATE COATING CHEMICALS


SEQUENCE OF OPERATIONS
STAGE No. 1 CLEANING SOLUTION
STAGE No. 2 RINSE
STAGE No. 3 ACP PHOSPHATE COATING SOLUTION
STAGE No. 4 RINSE
STAGE No. 5 FINAL ACIDULATED RINSE

U.S. ARMY PHOTOGRAPHS COURTESY OF "ORDNANCE MAGAZINE"

Typical spray and dip phosphating equipment and some ordnance products that are now given a protective phosphate coating for extra durability under all kinds of severe exposure conditions. Both military and civilian applications of ACP phosphate coating chemicals are shown in the chart below.

SELECTION CHART OF ACP PROTECTIVE COATING CHEMICALS FOR STEEL, ZINC, AND ALUMINUM

METAL	ACP CHEMICAL	OBJECT OF COATING	TYPICAL METAL PRODUCTS TREATED	GOVERNMENT SPECIFICATIONS
STEEL	"GRANODINE" Zinc Phosphate Coating Chemical	Improved paint adhesion	Steel, iron, or zinc fabricated units or components, automobile bodies, refrigerators, washing machines, cabinets, etc.; projectiles, rockets, bombs, rifles, small arms, belt links, cartridge tanks, vehicular sheet metal, tank bolts and links, recoilless guns, etc.	MIL-S-5002 JAN-C-490, Grade 1 JAN-F-495 U.S.A. 57-0-2, Type II, Class C U.S.A. 51-70-1, Finish 22.02, Class C U.S.A. 50-60-1 16 E4 (Ships)
	"PERMADINE" Zinc Phosphate Coating Chemical	Rust and corrosion prevention	Nuts, bolts, screws, hardware items, tools, guns, cartridge clips, fire control instruments, metallic belt links, steel aircraft parts, certain steel projectiles and many other components.	MIL-C-16232 U.S.A. 57-0-2, Type II, Class B U.S.A. 51-70-1, Finish 22.02, Class B Navy Aeronautical M-364 U.S.A. 72-53 (See An-F-20)
	"THERMOIL-GRANODINE" Manganese-iron Phosphate Coating	Wear-resistance anti-galling, safe break-in of friction or rubbing parts. Rust proofing.	Friction surfaces such as pistons, piston rings, gears, cylinder liners, camshafts, tappets, crankshafts, rocker arms, etc. Small arms, weapon components. Hardware items, etc.	MIL-C-16232 U.S.A. 57-0-2, Type II, Class A U.S.A. 51-70-1, Finish 22.02 Class A Navy Aeronautical M-364 U.S.A. 72-53 (See AN-F-20)
	"GRANODRAW" Zinc-iron Phosphate Coating	Improved drawing, extrusion, and cold forming	Blanks and shells for cold forming, heavy stampings; tube, tubing for forming or drawing; wire; rod; etc.	———
ALUMINUM	"ALODINE" Protective Coating	Improved paint adhesion and corrosion resistance	Aluminum products of similar design such as refrigerator parts, wall tile, signs, washing machine tubs, etc; aircraft and aircraft parts; bazookas (rocket launchers), helmets, belt buckles, clothes dryers, clothesline, rocket motors, etc., aluminum strip or sheet stock.	MIL-C-5541 (See also QPL-5541-1) MIL-S-5002 AN-F-20 U.S. Navord O.S. 675 16 E4 (Ships) AN-C-170 (See MIL-C-5541) U.S.A. 72-53 (See AN-F-20)
ZINC	"LITHOFORM" Zinc Phosphate Coating Chemical	Improved paint adhesion	Zinc alloy die castings; zinc or cadmium plated sheet or components; hot dip galvanized stock; galvanneal; signs; siding; roofing; galvanized truck bodies; etc.	QQ-P-416 FF-C-82 JAN-F-495 AN-F-20 U.S.N. Appendix 6 U.S.A. 72-53 (See AN-F-20)

CHEMICALS ACP PROCESSES

WRITE FOR DESCRIPTIVE FOLDERS ON THE ABOVE CHEMICALS AND FOR INFORMATION ON YOUR OWN METAL PROTECTION PROBLEMS

CHEMICALS ACP PROCESSES

mains unchanged, the overall steering ratio has been reduced to a value of 21.3 to 1.

Among smaller details offering improvements are: a new directional signal switch of simplified design and having a smaller number of parts; adoption of a 45-amp capacity generator with extruded type pole frame of solid construction which eliminates the use of a cover band; new instrument cluster on Series 40 models; plug-in type electrical terminals in which the male fitting is a thin, flat strip locked to the female connection by a spring clip; new distributor rotor which incorporates the resistance for electrical noise suppression.

On most models Buick now offers a choice of two rear axle gear ratios—a 3.6 to 1 economy ratio, standard on most Dynaflow models; and a 3.9 to 1 ratio, optional where 3.6 to 1 is standard.

Descaling

(*Continued from page* 43)

The illustration shows a general view of the production descaling operation at the Farmall Works plant, Rock Island, Ill. In operation, the bars are pushed automatically out of the furnace on carriers and dumped on a platform feeding a conveyor which moves the bars to the side of the furnace and onto live rollers. These rollers move the bars at a fixed speed through the inductor where the scale is removed. The bars pass onto the loading position where a pair of mechanical arms raise the bars from the live rollers and rolls them over to a skid, all automatically.

Power cost for cleaning approximately 900 ft of 3¼ in. diameter stock is $1.00. This low power cost plus reduced handling costs makes induction descaling an economical means of cleaning.

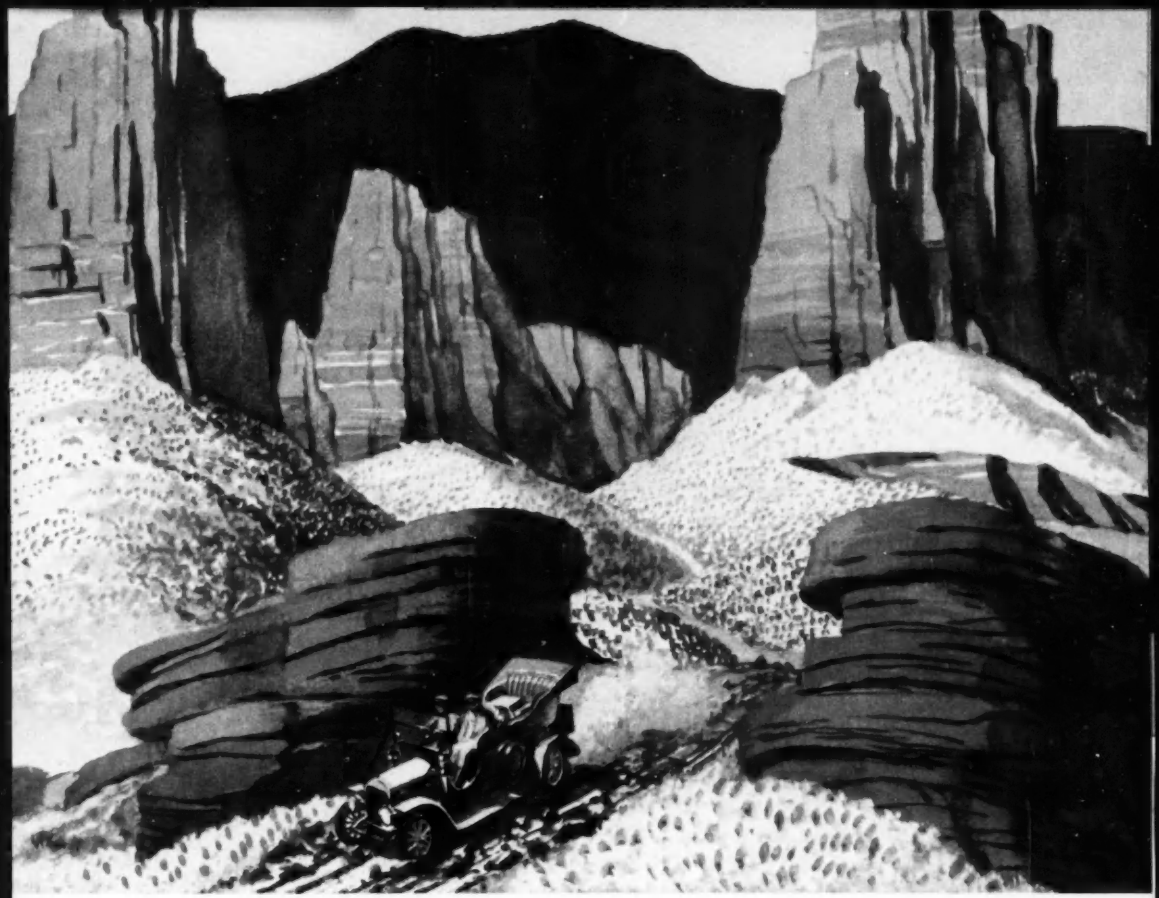
Fiat Jet Plane

(*Continued from page* 32)

high bending stiffness, ease of riveting. Wings are equipped with metal covered ailerons and split flaps. The wing tip panels can eventually be replaced by others of larger size to increase the wing surface and the aspect ratio in relation to service requirements.

Tail planes also are swept back, of thin profile, with metal covered and statically and dynamically balanced elevator and rudder.

The fuel supply installation comprises six metal tanks, two of which are housed in the central portion of the fuselage, and the others, two on each side, in the wing tips. Two extra metal fuel tanks can be mounted in the wing tips, one on each outer wing.



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Spicer-equipped automobiles as early as 1905 were among the first to blaze transcontinental highways across America. No garages... no service stations... and only the most primitive and punishing of trails for most of the distance. It was in these grueling tests that the then-revolutionary Spicer Universal Joint was proved superior to all other methods of power propulsion in automobiles. *We were there*... with design and manufacturing genius that helped make the automotive vehicle a commercial reality, and aided the automotive industry in becoming one of the world's largest enterprises.

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- True bearing alignment with rigid one-piece yoke design. *This rigidity is the essence of accuracy.*
- Precision bearings with improved surface hardness and finish.
- Dynamically balanced to exacting limits.
- Uniform high quality propeller shaft tubing. *Steel meets our special specifications.*
- Wide selection of flange and yoke types and sizes to suit each individual requirement.

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NEW PRODUCTS

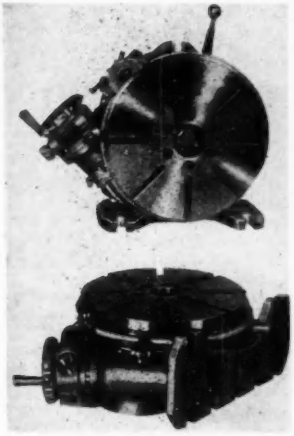
For additional information please use coupon on page 62

(*Continued from page* 80)

K-29—Optical Indexing Table

An optical indexing table, designed for use with milling machines, jig bores, die sinkers and similar machines for indexing and rotary milling, has been brought out by F. T. Griswold Mfg. Co., Wayne, Pa.

A precision engraved glass degree scale is observed directly through a telescope which, in conjunction with



Griswold optical indexing table.

circular dial, makes possible readings accurate to 0.0005 in. at periphery of 12 in. circle. Reading is made at a normal viewing distance. The turn table is supported at its periphery about its entire circumference. A forged spindle is mounted on a preloaded taper roller-bearing. Anti-friction bearings are used for all rotating shafts. A clutch permits hand rotation of the turn table. Locking a spindle to prevent rotation does not disturb table setting.

K-30—Rollover Clamp

Newest addition to the Baker Industrial Truck Div., Baker-Raulang Co., Cleveland, Ohio, line of special attachments for fork trucks is the roll-over-clamp. Designed for installation on 4000-lb capacity Baker fork trucks,

(*Turn to page* 114, *please*)

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B BETTER PRODUCTS AT LOWER
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For automobiles is just another of hundreds of difficult tubing fabrications manufactured in large quantities and at low cost by Michigan for its customers.

The overflow pipe is brazed to the filler tube at two points and the fastener clamps projection welded to the tube. The cam is spot welded to the tube mouth.

If you have not yet examined the possible adaptability of welded steel tubing to your product, Michigan engineers will be glad to discuss with you the many advantages of design simplification, production savings and product improvement made possible by the use of Michigan tubing.

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The Completely New Lincoln

(*Continued from page 37*)

usual heavy front cross-member. Instead there is a narrow but rigid cross member at the extreme front end of the frame, ahead of the engine, and a husky tubular member about midships of the engine. In addition, the side rails are deeply formed at the front to provide a completely integral mounting for knee action coil springs.

Under-hood space is quite compact and because of the location of the tubular member, mentioned above, the engine oil sump is located in front to provide the necessary clearance. Incidentally, the two forward engine mounts are located on the tubular member. The full-flow oil filter, fuel pump, generator, and oil pump, all are located on the underside of the engine where they are accessible from underneath the chassis. The muffler is built in two sections with resonator section in front.

The unique front suspension system stems from engineering studies over a period of some years, the objective being to reduce friction and steering effort without mechanical complication. On the other hand, the details of the installation have been dictated by the present chassis layout.

In essence, the front suspension is mounted to the front wheel spindle on special universal ball joints for the upper and lower suspension arms. Thrust is taken on ball bearings in the lower joint. It turned out that the resulting suspension was so friction free as to require damping. This is accomplished by the use of small Belleville type washers stacked in the upper end of the upper arm joint. It is claimed that steering effort now is so light that it was found feasible to reduce overall steering ratio.

Referring to the illustrations, it will be noted that the lower arm stamping is uncommonly widespread at its mounting to the frame. This is a direct result of spanning the distance between the two front cross members. In view of this arrangement, each end of the lower suspension arm is pivoted independently on the cross member, marking the elimination of the conventional pivot shaft.

The ball-joint mounting at the spindle has simplified the design of this part by the elimination of the usual king pin. Instead, the spindle has two terminal ends, as illustrated, one extended upward for the upper arm mounting, the other, downward for the lower arm mounting. Owing to the chassis changes at the front end, the sway bar has been changed to link type.

Steering geometry is essentially the same as before, except that the linkage is mounted compactly back of the tubular cross-member.

Rear suspension features remain about the same, except for the introduction of a special rubber rebound bumper near the front eye of both springs. The location of bumper mounting on the frame results from studies made of spring deflections, designed to damp spring action at a point which limits tendency to reverse camber.

Another novel feature is the adoption of a new type battery with a rubber case and 63 thin plates, smaller in size and 10 lb lighter than the previous one. It is mounted directly under the right front toe board and is reached through a small access door in the floor.

The brake system is new and surprisingly enough the wider drum being reduced in diamter from 12 to 11 in. The master cylinder for the hydraulic brake system now is mounted on the front of the dash. This location promotes the adoption of suspended brake

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Number of cylinders	8
Bore and stroke, inches	4½ x 4¼
Displacement, cubic inches	540
Horsepower, rated at rpm	207/3000
Speed range, rpm	800-3200
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and clutch pedals, pivoted in a bracket mounted between the dash and instrument panel.

As mentioned earlier, bodies for Lincoln cars are entirely new, with a high prominent fender line and low, flat hood contour, making for improved visibility. The rear fender profile is stamped directly into the rear quarter panel. All doors are hinged at the front with offset hinges readily adjustable to facilitate door hanging. Door weight has been increased and the seat redesigned for easier entry. Front head room is increased by 1¼ in. while rear head room is upped by ¾ in. In addition, leg room is increased by two in.

Interiors and trim have been restyled, featuring new instrument panel treatment, and a new steering wheel with a large shift indicator built into the steering jacket for automatic transmission control.

At the rear the deck lid lock is of key release type, deck lid operation being handled by means of scissors type hinge mechanism mounted on each side clear of luggage area. Unusual feature at the rear is the recessing of the fuel filler in the panel below the deck lid, directly behind a swing-out, hinged type license plate holder.

Business Pulse

(*Continued from page* 52)

Higher Business Levels

In support of the view that higher business levels are in prospect for the coming year, a number of factors in the current business situation can be cited. The quarterly report of the Department of Commerce and the Securities and Exchange Commission indicates that business units are planning to spend more than $5.7 billion for new capacity in the first quarter of 1952, as compared with $5.5 billion spent in the first three months of 1951. A further indication of rising business levels is seen in the fact that shipments of machine tools rose steadily from July to November, with an aggregate increase in the rate of deliveries of 56 per cent. Unfilled orders of manufacturing firms at the end of October were valued at $64,413 million, as against $37,449 million a year earlier. Residential construction, after declining for some time, showed a tendency to level off in the final quarter of 1951, presumably because of easier credit terms and more adequate supplies of materials. Wholesale prices have been relatively stable over the last several months after the substantial decline between March and August. Finally, it is believed that inventories, which were considered unwieldy in the early months of 1951, have been reduced to levels which are in line with current sales.

(*Turn to page* 106, *please*)

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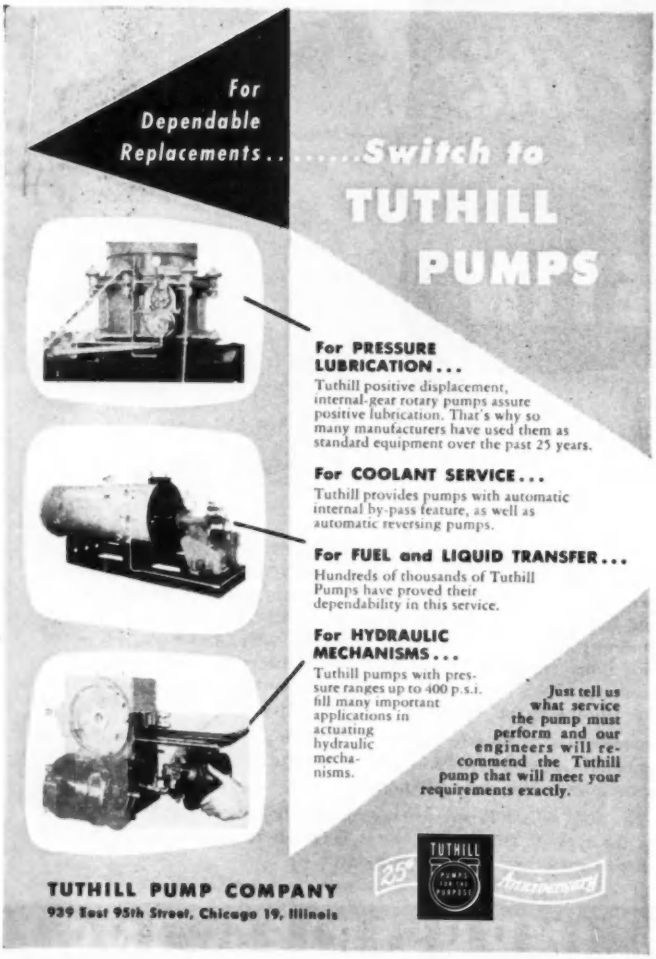
The BUSINESS PULSE

(*Continued from page* 104)

Backlog of Consumer Demand

Moreover, there seems to be a belief in some quarters that the backlog of consumer demand accumulated during World War II had not fully been worked off before the outbreak of Korean hostilities interrupted the process of filling deferred needs. It is reasoned that as the present defense effort bgins to taper off, the needs of consumers will reassert themselves, thus providing a sustaining influence on general business levels.

When general business indicators for 1951 as a whole become available, they will reveal moderate increases above 1950 levels. The aggregate money value of the national product may possibly show a rise of as much as 15 per cent. A large part of this increase, however, will reflect price advances, rather than growth in physical output. The index of industrial production compiled by the Federal Reserve Board may indicate an increment of as much as 10 per cent. The Guaranty Trust Company's index of business activity will show a smaller gain, probably not exceeding four per cent. This is partly because the index of activity allows for normal year-to-year growth as well as for price changes, and partly because it includes certain indicators of trade activity, which, of course, are not included in an index of industrial output.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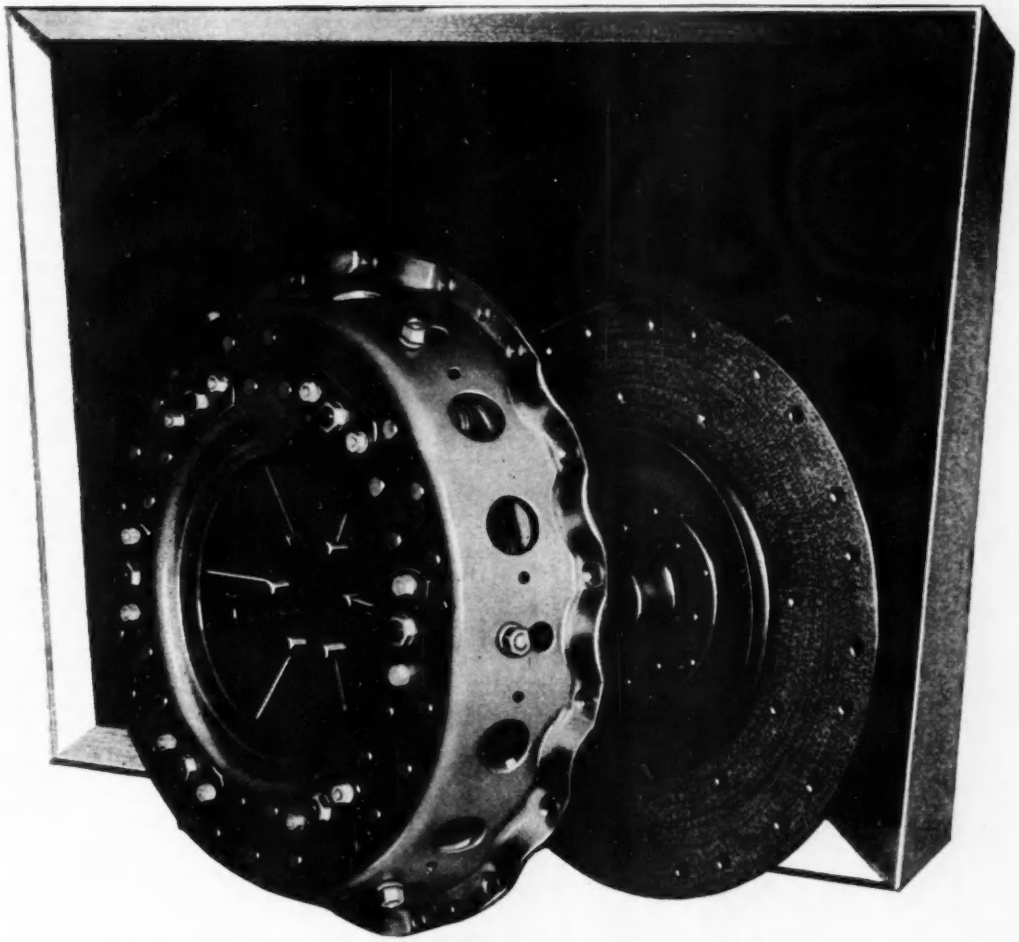
Personal Income Up

The most recent data on employment and unemployment indicate that the level of national income was well maintained in the final months of the year, as it certainly was in the earlier months. Personal income was at the annual rate of $257.5 billion in October, a new record high. The trend during the year was almost uninterruptedly upward, and for the first ten months of the year personal income totaled approximately one-eighth more than in the like period of 1950.

One conspicuous exception in the generally satisfactory picture of employment and income is the automotive center of Detroit. Government officials estimate that from 115,000 to 125,000 automobile workers in this area are currently idle because of cutbacks in civilian production which have not yet been adequately offset by defense contracts. It is feared that this figure may rise to 200,000 if tentative plans of the Defense Production Administration for further cutbacks are carried out. This situation is reflected in trade activity in the Detroit area, department store sales in the final pre-Christmas week having been 4½ per cent smaller in value than a year earlier.

Decrease in Imports

Manufacturers and other businessmen who do a substantial volume of export business were given cause for concern by the third-quarter report on the balance of payments of the United States. In that period foreign dollar receipts, which provide the means for purchase of United States exports, declined by a total of $880 million from the preceding quarter. This occurred because of a decrease in imports, a decrease in Governmental assistance to foreign countries, and a reduction in the net flow of United States capital abroad. This decline was partially offset by reduced foreign expenditures in this country, but even so, foreign countries sold about $290 million of gold to the United States in order to balance accounts. This represented the first occasion since the third quarter of 1949 that foreign nations as a whole had to draw upon their resreves. In the interval the United States has made gold and dollar payments to other countries totaling $5.1 billion. While many of the



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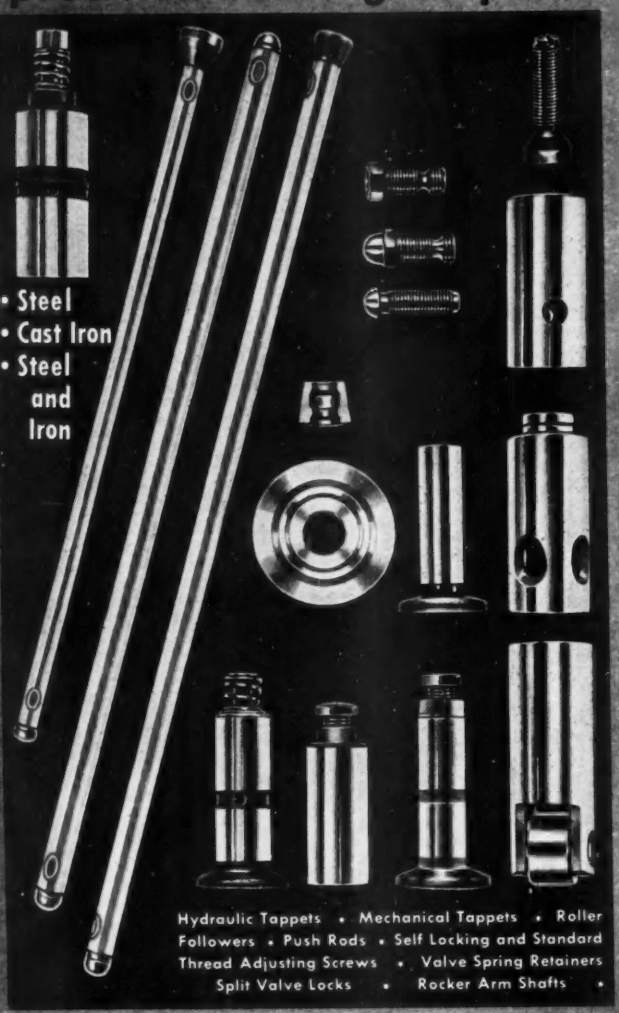

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factors which gave rise to this gold payment are considered of temporary nature, the export picture remains cloudy because of new restrictions recently imposed by several European nations on dollar imports.

Demand for goods and services will be well sustained in farm areas during the coming year, to judge from predictions of farm income in 1952 made by the Bureau of Agricultural Economics. Production goals have been established which, if realized, would raise farm output by an estimated four to six per cent above the 1950 level. Assuming that farm prices will average about the same as in 1951, this would give farmers more money receipts, although their net income may be about the same as in the preceding year because of higher production costs.

Fuel Tanks

(*Continued from page* 33)

conformance with the shape or contour of the tank, special jigs and fixtures had to be provided. Considerable effort by the manufacturing departments using the equipment helped to solve the multitude of problems encountered, among the foremost being the selection of the proper welding rod, correct speed of the torch, and speed of the rod.

To obtain a consistent and uniform bead on the weld, it was very important to have the butt joint in a straight line with a maximum gap limited to 1/32 in. at any given point. This problem was overcome by using suitable clamping and indexing features, in the weld fixtures, coupled with a profile templet to guide the torch and maintain a specified dimension between it and the tank. To further aid the end result of a uniform weld, a copper back-up or supporting bar was used for dissipating the heat, thus reducing the tendency for the material to warp or buckle.

BOOKS . . .

INCENTIVE MANAGEMENT, by *James F. Lincoln*, published by *The Lincoln Electric Co., 22801 St. Clair Avenue, Cleveland, Ohio.* Price $1.00. If you work for a living in business or industry either as a factory worker or supervisor, office worker, department head, manager, or executive, your skill at your job determines the money you make, the personal satisfaction you gain, and the value your customers receive.

How people can develop as skillful individuals taking pride in the cooperative application of their respective skills towards making better products or giving better service is the concern in Lincoln's writing. The mainspring of that development of skill is incentive, and the fundamental incentive in Lincoln's thinking is *recognition* of that skill and the results it achieves in higher pay, greater output and lower prices. How we can put this incentive into our business life as we do in other phases of our life, and how everyone will benefit thereby is the problem and thesis to which Mr. Lincoln has addressed himself.

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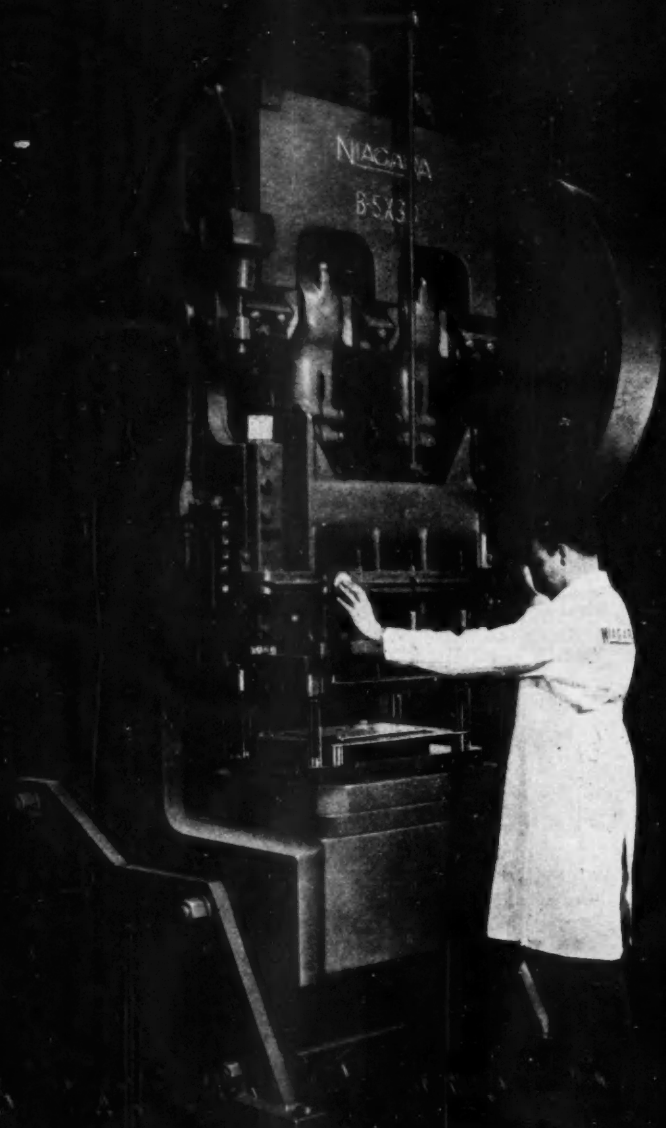

for Defense Production

Niagara No. BI-5x30 Gap Frame Double Crank Inclinable Press fitted with magnetic perforating dies made by S. B. Whistler & Sons, Inc., Buffalo, N. Y. Press equipped with air actuated electrically controlled sleeve clutch.

Write for Specifications

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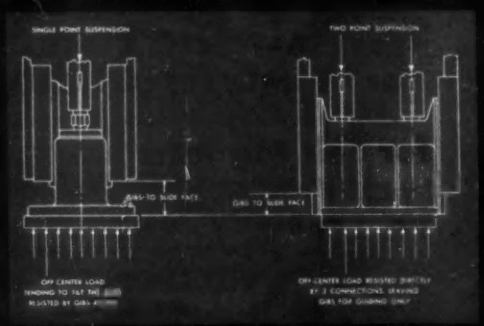
PRESENTS The NEW

No. BI-5x30 Double Crank Inclinable Press

Gap Frame with one-piece welded steel frame



- Gives full support to wide dies, impossible to obtain on the conventional single point Inclinable Press even with slide flanged out.
- Gibbing may be brought closer to point of load application on this double crank press than with flanged slide single crank design.
- Two point suspension resists tendency of slide to tilt under off-center loading conditions.
- Niagara gap frame construction gives equal access to all four sides of die. No ribs or shafts extending across the back of press.
- Inclined position permits finished work to drop off the rear of the press.
- Gearing enclosed and running in oil.
- Backshaft mounted on anti-friction bearings.
- Air counterbalance for slide.
- Bronze bushed main and connection bearings.
- Niagara electrically controlled air actuated sleeve clutch.
- Air releasing brake.

Similar presses are made in sizes ranging from 3½" to 6½" diameter shaft. Sizes 3½" and 4" are made with mechanically operated sleeve clutch.

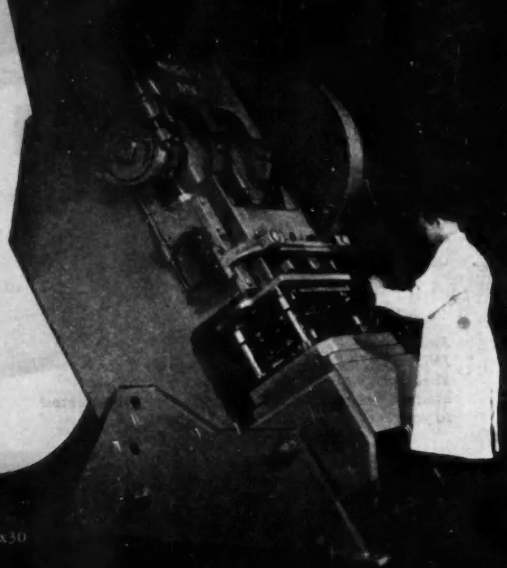


Illustration shows Niagara No. BI-5x30 press in inclined position.

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Special Machine for Jet Engine Parts

(*Continued from page 54*)

Mueller Engineering Co., Dearborn, Mich., and will be built and distributed by Danly.

A new form of indexing mechanism assures accurate spacing and will reproduce uniform parts consistently. The master index ring is quickly interchangeable and location of holes will be pierced according to the location of the slots in the master ring. The index mechanism makes it possible to vary the spacing between holes or groups of holes as required in given cases.

A constant torque is applied to the index table which is actuated by means of a hyrdaulic fluid motor through a speed reducer. A large ring gear is used to drive the index table, actuated by a pinion driven by the speed reducer.

The piercing unit is of a floating type actuated by a hydraulic cylinder. The hydraulic power cylinder acts as the cross head slide. The cylinder is also equipped with a hydraulic stripping mechanism; consequently, no springs are required and changing of tools is simplified.

The hydraulically operated C-frame slide eliminates distortion of part while piercing and also part is clear of die block during index cycle, eliminating danger of marking part and wear on die block.

Actual force to perform piercing operation is equalized; the part is merely pinched between punch and die with the same force on both sides, thus preventing distortion.

The machine has a capacity of 56 tons at 10,000 psi working pressure. The hydraulic power system is completely free of high pressure surge shocks due to the unique design of the hydraulic converter. There are no high pressure controls except the converter itself. All directional controls and pressure relief valves are of standard design, either 1000 psi for 5000 psi operations or 2000 psi for 10,000 psi operations. The high pressure converter is a combination of a continuous booster and low and high pressure admission valve. The selector spool in the high pressure admission valve has a built-in decompression spool which prevents directional spool from shifting until oil under compression has been released and, therefore, no surge shock ever occurs. All hydraulic directional controls, including converter are panel mounted and easily accessible.

The electronic controls, including magnetic starter and line voltage to 110 volt transformer, as well as all control releases, are mounted in an enclosed cabinet per J.I.C. electric standards. The push button station is conveniently located for the operator and has all the necessary control buttons to actuate the machine. A selector switch is provided for either automatic or manual operation. The manual operating circuit is for set-up purposes only.

Test Cabinet

for SALT FOG CORROSION TESTS or HUMIDITY CORROSION TESTS

for Salt Fog Tests Meets the latest specifications of government and military authorities.

for Humidity Tests 95% to 100% relative humidity at room temperature to 125° F., temperature thermostatically controlled.

features

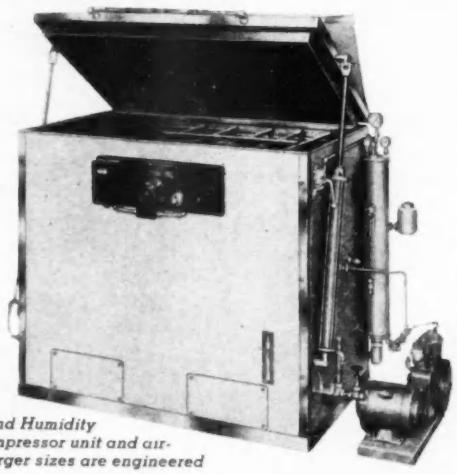
Lucite nozzle

Built-in heaters

Fully insulated

Exhaust flange at rear

Air-operated cover lifter (extra)



Standard size No. 1 INDUSTRIAL Salt Fog and Humidity Test Cabinet with air-compressor unit and air-operated cover lifter. Larger sizes are engineered to your requirements.

Write for complete information and recommendations

FILTERS Pressure Type · PUMPS Centrifugal · CORROSION TESTING APPARATUS Salt Fog • Humidity

INDUSTRIAL FILTER & PUMP MFG. CO.

5920 Ogden Avenue
Chicago 50, Illinois

RUBBER DIVISION Vulcanized Linings • Molded Products · WATER DEMINERALIZERS

Tank Hull Output

(*Continued from page 42*)

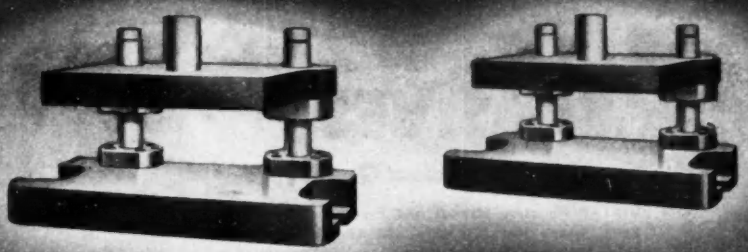
were finished. In the next setup, 40 holes are drilled in the lip of the turret ring. At present, Baldwin engineers are working on a very unique tool setup to perform this operation in less than half the time.

When the tank is completely welded and machined, it is very thoroughly checked for final Ordnance approval. As a quality control measure, tank hulls are taken to the new one-million volt X-ray room for weldment inspection.

As the tanks are approved, they are passed through the new wash and paint line. Composed of DeVilbiss equipment, the line is of the straight-through type starting with degreasing operations and finishing with the exterior and interior painting. The finished hull contains about 1100 component parts.

BAUMBACH DIE SETS...

A reliable service for the Stamping Industry



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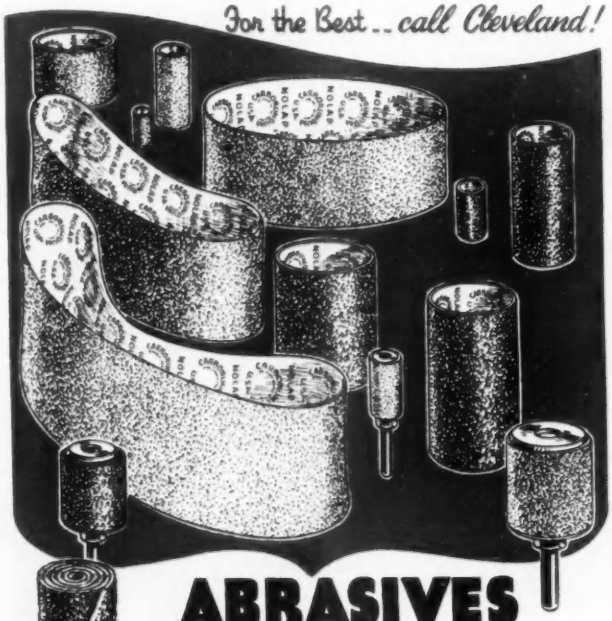

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NEW PRODUCTS

For additional information please use coupon on page 62

(*Continued from page* 101)

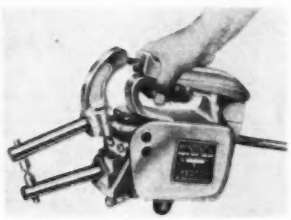
the roll-over clamp can handle pallet loads of material on the forks, dump skid boxes with the rotating head and use the forks as clamps for handling miscellaneous objects.

A 4000-lb fork truck outfitted with the rollover-clamp will handle loads up to 2400 lb, 48 in. long.

K-31—Spot-Welder

A portable spot-welder weighing only 24½ lb including arms, electrodes and power cable has been developed by Marquette Mfg. Co. of Minneapolis, Minn.

Featuring semi-automatic timing control and a high leverage system developing high, controlled pressure, the welder employs the "squeeze and heat" process.



Marquette spot welder.

The Porto-Spot toggle type lever holds metal under maximum pressure. As the handle is squeezed shut, the automatic switch applies the high amperage.

Specifications of the model 275 follow: 220-240 v, 50-60 cycle, single phase, 50 amp fuse recommended. Draws current only when handle is squeezed shut. Spotwelds mild and stainless steels up to ⅛ in. combined thickness.

K-32—Jet Engine Starter

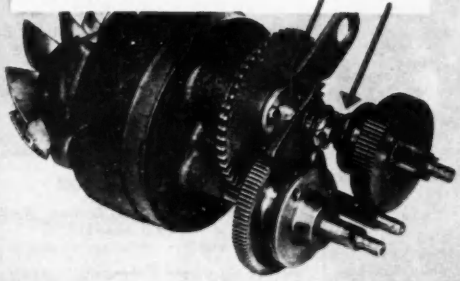
An automatic jaw meshing mechanism for a jet engine starter has been developed by Jack & Heintz, Inc., Cleveland, Ohio. This mechanism, used with the D31-1 starter, consists of a phosphor bronze friction ring which restrains jaw rotation and permits a cam to ride down a ramp to extend the

(*Turn to page* 124, *please*)

2 WALDES TRUARC RINGS REPLACE COTTER PINS AND WASHERS... SAVE $.0219 PER UNIT

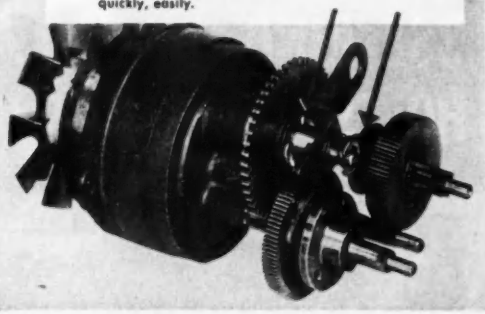
OLD WAY

Cam shaft for breathing roll ironer mechanism required: drilling 2 holes; 2 cotter pins; 2 washers. Inaccuracy in locating holes for cotter pins caused frequent rejects.



NEW WAY

2 simple grooves to accommodate 2 Waldes Truarc Rings, are cut in shaft during regular screw machine cycle—at no extra cost. Waldes Truarc Rings are applied quickly, easily.



Using 2 Waldes Truarc "E" Retaining Rings in their Automatic Cabinet Ironer, saved The Horton Manufacturing Co., Fort Wayne, Ind., $.0219 per unit. Truarc Rings saved 50% in assembly time . . . cut down on rejects . . . increased efficiency of the unit . . . eliminated risk of damage to hands and clothing of workers in assembly.

Redesign with Truarc Rings and you, too, will cut costs. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better job of holding parts together.

Truarc Rings are precision-engineered . . . quick and easy to assemble and disassemble. Remain circular to give a never-failing grip. They can be used over and over again.

Find out what Truarc Rings can do for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

COMPARATIVE COSTS—

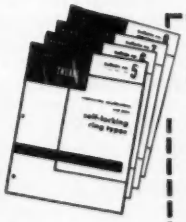
WITH COTTER PINS		WITH TRUARC RINGS	
MATERIAL:		MATERIAL:	
2 washers	.0045		
2 cotter pins	.0017	2 Truarc E Rings	.0283
OPERATIONS:		OPERATIONS:	
drilling 2 holes in shaft	.0223	Cutting 2 grooves	.0000*
ASSEMBLY TIME	.0485	ASSEMBLY TIME	.0268
Total cost	$.0770		$.0551

TOTAL SAVINGS WITH TRUARC RINGS $.0219 PER UNIT

*Grooves are cut in shaft during regular screw machine cycle

For precision internal grooving and undercutting . . . Waldes Grooving Tool.

SEND FOR NEW BULLETINS ➡



WALDES TRUARC

REG. U.S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 2,382,947; 2,382,948; 2,416,052; 2,420,021; 2,428,361; 2,439,795; 2,441,840; 2,458,105; 2,463,300; 2,463,583; 2,467,602; 2,467,803; 2,491,309; 2,508,081 AND OTHER PATENTS PENDING

Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N. Y.
Please send engineering specifications and data on Waldes Truarc Retaining Ring types checked below. AY-814

- ☐ Bulletin #5 Self-locking ring types
- ☐ Bulletin #6 Ring types for taking up end-play
- ☐ Bulletin #7 Ring types for radial assembly
- ☐ Bulletin #8 Basic type rings
- ☐ Send me information about the Waldes Grooving Tool.

Name _____

Title _____

Company _____

Business Address _____

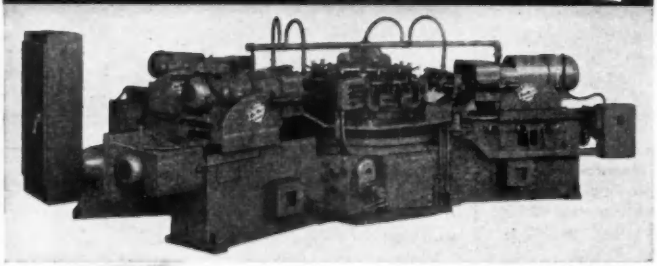
City _____ Zone _____ State _____ 3678

Defense Contract Awards

This latest list of defense prime contracts that have been awarded covers the period from Nov. 23 to Dec. 6. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

Unit quantities and dollar amounts are given for contracts from $25,000 to $250,000. Contracts above $250,000 are indicated by "over $250,000," but their actual dollar amounts and unit quantities are not available. In some instances the quantity and the dollar value have not been released by the Department of Commerce and this is indicated by the letters "N.F." (not furnished) in this list.

Drilling and Reaming
388 KING PIN HOLES PER HOUR



Station Type Indexing Machine for drilling and reaming king pin holes.

On a Davis & Thompson 5 Station Machine

This type MDT FIVE STATION INDEXING DRILLER has five fixtures mounted on the index table. Each of these fixtures holds 2 RH and 2 LH automobile front suspension support arms. Four ROTO-MATIC Power Heads, each having four spindles, perform the following operations:

1. Drill 53/64" dia.—Half way through.
2. Drill .823" dia. — Balance of way through.
3. End Cut Ream .8547/.8550" — Full length of hole.
4. Finish Ream .8635/.8637"—Full length of hole.
5. Load and Unload.

Two RH and two LH pieces are completed at the end of each cycle. Cycling is automatic, and, operator loads and unloads during machine cycle.

4 New Davis & Thompson Mechanical Power Heads

Included in the design of this machine are the new ROTO-MATIC Mechanical Electrical Power Heads operated through screw feed. An important safety feature of these units is the patented overload release clutches on the feed. Because of the simplicity of their design the units require a minimum of servicing.

Free Data

Will be furnished on request.

DAVIS and THOMPSON Roto-Matic

Davis & Thompson Company
6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

—A—

Active Gear Co., Chicago, Ill.
Vehicle parts—over $250,000

Aeronautical Machinery Co., c/o Nestor Johnson Mfg., Chicago, Ill.
Tail jack—97 ea.—$70,654

American Auto Parts Co., Kansas City, Mo.
Vehicle parts—125,000 ea.—$71,250

American Generator & Armature Co., Chicago, Ill.
Vehicle parts—over $250,000

The American Rubber Mfg. Co., Oakland, Calif.
Hose—605 ea.—$118,770

American Thermal Ind., Inc., Detroit, Mich.
Vehicle parts—1760 ea.—$40,864

Auburn Spark Plug Co., Auburn, N. Y.
Spark plugs—270,000 ea.—$78,570

—B—

Barber Greene Co., Aurora, Ill.
Spare parts—various—$57,000

J. B. Beaird Co., Inc., Shreveport, Louisiana
Vehicle parts—4530—$140,139

Bemis Bro. Bag Co., St. Louis, Mo.
Vehicle parts—1810 ea.—$26,046

Bower Roller Bearing Co., Detroit, Mich.
Hardware—55,185 ea.—$29,001

—C—

J. I. Case Co., Racine, Wisconsin
Tractor—56 ea.—$135,000

Caterpillar Tractor Co., Peoria, Ill.
Spare parts—various—$35,250
Spare parts—over $250,000
Spare parts—over $250,000
Spare parts—over $250,000

Commonwealth Brass Corp., Detroit, Mich.
Hardware—526,000 ea.—$30,451

Consolidated Vultee Aircraft Corp., San Diego, Calif.
Maintenance parts—612 ea.—$29,239

S. J. Corbett Co., Detroit, Mich.
Vehicle parts—3050 ea.—$27,755

Crane Co., Phila., Penna.
Valves—753 ea.—$69,408

Cummins Engine Co., Columbus, Ind.
Spare parts—various—$57,000

—D—

Detroit Michigan Stove Co., Battle Creek, Mich.
Vehicle parts—over $250,000

(*Turn to page* 119, *please*)

Distinguished in the minds of experienced users for real dependability, for extraordinary capacity to take punishment and keep right on doing an efficient, trouble-free job—Clark axles, for trucks, buses, farm and industrial equipment.

It does indeed pay to Work with Clark

SEE NEXT PAGE FOR MORE ABOUT CLARK PRODUCTS

CLARK EQUIPMENT COMPANY, Buchanan, Michigan

Other Plants: BATTLE CREEK AND JACKSON, MICHIGAN

USERS OF CLARK ELECTRIC FORK-LIFT TRUCKS

are well prepared to meet the twin challenges of *labor shortage* and *increased user demands*. They've equipped their manpower with *enough more power* to get the job done, whatever it may be. *Getting the job done* is more important now than ever before; therefore, the fork-lift truck takes on added importance to production of goods essential to the military and to the civilian economy. In equipping workmen with fork-lift trucks, you make them much more productive while easing demands on their energies; you make them more valuable to you—and to themselves.

CLARK ELECTRICS ***(Fork Truck capacities, 1000 lbs. to 7000 lbs. Electric-Powered Hand Trucks, 6000 lb. capacity)*** are ideal equipment for many handling operations—in cold storage plants, food and chemical processing and similar installations. They actually do more work and at less cost, as a result of these superior features:

- automatic acceleration
- hydraulic brakes
- more dependable power
- easy steering
- faster speeds
- "Dead-Man" safety controls
- finger-tip direction control

As a step toward more power for your manpower, get well acquainted with Clark Electrics, Clark gas-powered machines and the whole Clark Leadership Line of materials handling equipment. Send the coupon and get facts of fundamental value.

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
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(*Continued from page* 116)

—F—

Federal Mogul Corp., Coldwater, Mich.
Vehicle parts—10085—$54,147

—G—

General Metals Corp., Enterprise Div., San Francisco, Calif.
Spare parts for type—(6 items)—$29,019
DSG 318 Enterprise
Diesel Engine

GMC, United Motors Service Div., Detroit, Mich.
Batteries—7655 ea.—$144,756

The Goodyear Tire & Rubber Co., Inc., Akron, Ohio
Hose—245 ea.—$53,297

Gould-National Batteries, St. Paul, Minn.
Batteries—over $250,000

Grimes Manufacturing Co., Urbana, Ohio
Parts—519 ea.—$64,669

—L—

Lipe-Rollway Corp., Syracuse, N. Y.
Vehicle parts—over $250,000

Little Giant Tree Feller Corp., Dallas, Texas
Tractor—over $250,000

—M—

The Maxim Silencer Co., Hartford, Conn.
Vehicle parts—over $250,000

Minneapolis Moline Co., Minneapolis, Minn.
Tractor—over $250,000

—N—

The National Supply Co., Springfield, Ohio
Diesel Engine Generator—(7 items)—$51,538
Electrical Plant

North Western Auto Parts Co., Minneapolis, Minn.
Vehicle parts—1270 ea.—$27,762

—P—

Piasecki Helicopter Corp., Morton, Pa.
Service & material—various ea.—$35,000

—R—

Rome Grader Corp., Rome, N. Y.
Motorized road grader—1 LineIt—265—over $250,000
Motorized road grader—265—over $250,000

—S—

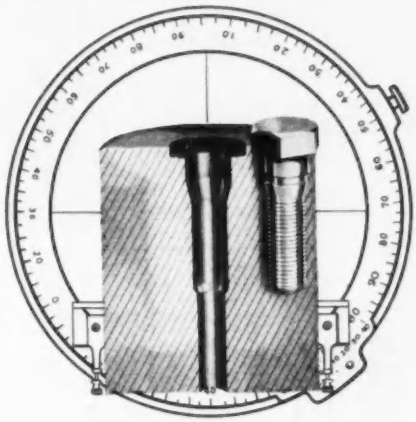
Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y.
Distributor—35 ea.—$44,094

Seth Thomas, Thomaston, Conn.
Accelerometers—1960—$151,500

—T—

Titeflex, Inc., Newark, N. J.
Ignition, assy.—69 ea.—$28,073
(*Turn to page* 120, *please*)

IT TAKES MORE THAN MACHINES TO MAKE GOOD COLD-FORGED PARTS!



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STANDARD
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When you want Special Parts or Fasteners held within "Tenths", CAMCAR technicians can supply them to *your inspection standards.*

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CAMCAR SCREW & MFG. CORP.

606 Eighteenth Avenue, Rockford, Illinois

"*Production-Designed* FOR YOUR ASSEMBLY LINE"

(*Continued from page* 119)

— U —

The Union Diesel Engine Co., Oakland, Calif.
Generators—3 ea.—$203,556

United Aircraft Corp., Chance Vought Aircraft Div., Dallas, Texas
Maintenance parts—over $250,000

United States Gauge Div., American Machine & Metals Inc., Sellersville, Pa.
Engine parts—12960—$64,484

— W —

Westinghouse Electric Corp., Phila, Pa.
Maintenance parts—4845 ea.—$112,753

AIRBRIEFS

(*Continued from page* 64)

the plan is manifestly impractical. Here is the largest military airplane in the entire world that must race down a 10,000-ft runway accompanied by the roar of eight of the world's most powerful turbojet engines and circle around Seattle, Washington, to come to rest again on that runway on an average of two or three times a week for the next six months—and Secretary Finletter wants it kept a secret! Here is front-page news for every reporter and photographer in the country and the only thing standing between the giant bomber and the newspapers is a highly debatable patriotic plea by a Cabinet member in Washington, D. C.

We agree with the Secretary that Russia should not know the effective range of the airplane, the range of its radar equipment, its operating altitude or its defensive armament — these secrets can be kept quite easily. But to attempt to hide this huge monster from the photographer is ridiculous. Far better that official USAF photographs, suitably retouched, be distributed to anyone who wants them than to make a challenging game of cops-and-robbers out of this nation's No. 1 military weapon of the future.

International Taunt

One of the most tantalizing maneuvers in the British-vs-U. S. jet transport battle has come to light in the fact that the sleek British Comet jet airliner may soon be operating across the United States — yet no American can be on board. Under the original "Bermuda Agreement" of 1946, all nations of the world have the right to fly across the territory of any other nation —but they must not board or discharge passengers in so doing. Britain now plans to use this provision with announcement that it will operate a London-Gander-New York-Tulsa-San Francisco-Honolulu-Sydney-Singapore route using the DeHavilland Comet airliner. British Overseas Airways, therefore, may be flying its Comets from New York to Tulsa to San Francisco in the most provocative manner: it cannot pick up passengers in New York and transport them to San Francisco.

Actually, such a service is several years in the future since it will require the so-called Avon-Comet (the airliner powered by four Rolls-Royce Avon engines) version, which will not be ready until about 1955. However, BOAC has already announced its intention of operating the standard DeHavilland Ghost-powered Comet airliners in 1953 on New York-Bermuda and New York-Nassau routes.

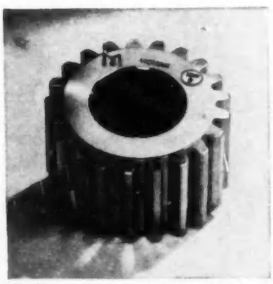
Cost vs Cleverness

Airplane wings taper progressively in thickness from the root out to the tip and this, of course, requires a tapered front and rear spar. Such spars have been fabricated for nearly 20 years by using a sheet web that tapers in height with the top and bottom caps being heavy extrusions. This method requires about 50 major parts, hundreds of manhours of machining, drilling and assembly time. A McDonnell Aircraft production executive has eliminated all of this by suggesting that a constant-height spar be extruded, i.e., with integral web, upper and lower capstrips. Along its

gear problems are as different as **night** and **day**

but . . .

Skilled craftsmen, complete facilities and background experience at IGW permit production of precision parts with strict adherence to the toughest of specifications.



This planet pinion has .0003 MICROWN* —IGW's new after-grinding, high precision crowning process.

*Patent Pending

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No. 116
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Firewall 1/2" Felt
No. 151
3/32" doubled on No. 430 Jute Felt Dash Insulation Top Pad (or Panel)
No. 196
Dash Insulation Pad
Plastic-coated 5/16" Felt

middle is a circular bulb. This spar is placed on its side and the bulb is progressively flattened from tip to root by forging. Final result is a single-piece spar that is accurately tapered—without machining, assembly or 50 separate parts. And it is 50 lb lighter than the former design. (See AUTOMOTIVE INDUSTRIES, May 1, 1951.)

Forging vs Machining

This above-mentioned example of saving of forging over machining places in sharp focus this current controversy in aircraft production. The high loads and thin wings required for high-speed aircraft have made tapered spars and skin sheets inevitable. Integral stiffening is essential due to the restricted space within the wing. This type of structure can be made in two ways: either by press forging or by machining from raw stock, and the advantages and costs of both methods are currently a heated argument in the aircraft manufacturing industry.

Lockheed Aircraft has placed all its eggs in the machining method and has assembled its well-known "Hall of Giants" to do the job of machining tapered, integrally-stiffened skin sheets from plate stock. Lockheed admits that it is gambling that forge presses of the size required for the job will not be available within the foreseeable future. Other manufacturers believe that really large presses can do the job quicker and cheaper.

Now it appears, however, that Lockheed may be right with the news that the Air Force-sponsored large forge press program is badly stalled. USAF had projected 25,000-, 35,000- and 50,000-ton forge presses with an earlier 75,000-ton press idea being shelved two years ago. Air Force had set aside $210 million for the development of 12 die-forging presses of 18,000-75,000-ton capacity and 13 extrusion presses of 8000-25,000-ton capacity for delivery in 1952. At the moment the largest forge presses available are an 18,000-ton Mesta unit at the Wyman-Gordon plant at North Grafton, Mass. (built in 1944 with Government funds), a 15,000-ton press at Alcoa's Cleveland plant and a 15,000-ton press at the USAF pilot plant at Adrian, Mich. None of the projected new presses is expected to be ready in 1952. So Lockheed's machining method, for all its drawbacks, may prove long on foresight.

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is your News Magazine of Automotive and Aviation
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"O. K. Let's talk to Bendix. They've got the fastest production line in the industry."

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MOST TRUSTED NAME IN

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Radios that reach your production line two weeks . . . two days . . . or even two hours late can raise hob with your schedules and put a crimp in your profit. Certainly the car will run without a radio, but how about that customer looking forward to hours of driving and *listening* pleasure—or the dealer who's looking for that extra sale.

There's one way to be sure that your radios are johnny-on-the-spot when you need them. Talk to Bendix! Their production line and manufacturing methods are patterned after your own. They're flexible, too, because they can be geared to even your highest capacity production. That's because Bendix—long recognized as an outstanding automotive supplier—understands quantity production and knows how to put that knowledge to work for the automotive industry. As for quality . . . Bendix* auto radios have been performance-tested on the cars of one of America's largest manufacturers. Their record for trouble-free operation stands unequalled.

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BALTIMORE 4, MARYLAND

NEW PRODUCTS

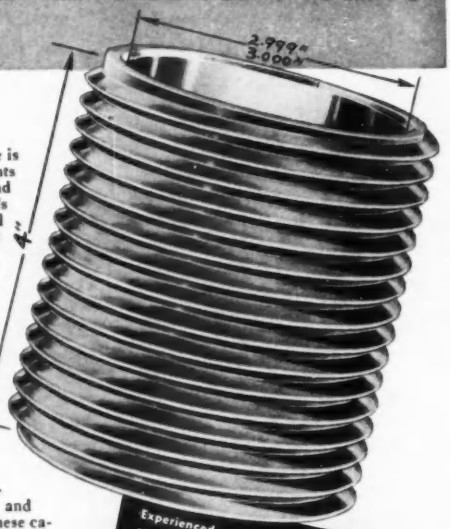
For additional information regarding any of these items, please use coupon on page 62

(*Continued from page* 114)

starter jaw. As the jaw moves out, tension on the friction ring decreases. At full extension, there is no tension of the ring on the jaw.

The constant current, variable voltage starter is rated at 9-30 v d-c, 1000 amp, 800 rpm, 20½ hp. It weighs 46 lb and has an overall length, including end terminals, of 13 13/16 in.

Expertly machined HARDENED & GROUND PARTS



THE sleeve shown here is a large piece and represents an exacting job—the kind we handle well. It calls for accurately hobbed threads over the full length . . . a polish-ground bore concentric with the pitch diameter of the threads . . . tolerances that challenge our ingenuity and skill.

Brown Hardened and Ground Parts have served the automotive industry for more than 40 years. In that time we've gained invaluable experience in precision machining, scientifically-controlled heat treating and micro-finish grinding. These capable facilities are at your command. Merely send us your prints; write or wire your requirements.

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King Pins • Shackle Bolts • Shackle Pins
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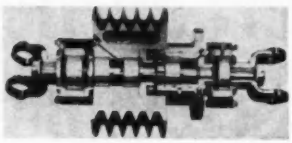
K-33—Power Take-Off

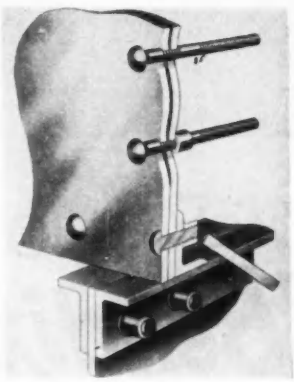
A heavy-duty power take-off to fit all standard motor trucks has been announced by Davey Compressor Co., Kent, Ohio.

Known as the Davey P-80, the take-off is guaranteed by the company to transmit full engine power to the driving of heavy-duty truck-mounted equipment. It is said to contain 12 less parts than its predecessor model, Davey 75, and is 25 lb lighter. Another new feature is a vacuum shift control which is offered as optional equipment. The take-off unit itself is identical for all trucks. The P-80 is 18 in. long and weighs 140 lb.



Davey power take-off, model P-80.

K-34—Fastener



The Cherry Rivet Co., Div. Townsend Co., Los Angeles, Calif., have announced the recent addition of lock bolts to their line of blind rivets and structural fasteners. Lock bolts are high strength two-piece fasteners, consisting of a pin and a collar. The pin is inserted in the work from one side, and the collar slipped onto the pin from the opposite side. A special pneumatic tool installs the lock bolt.

K-35—Hydraulic Control Valves

Heavy duty and light weight spool and sleeve type hydraulic control

(*Turn to page* 129, *please*)

FRAM stands for QUALITY

IN major plants across the nation, in modern laboratories and engineering facilities, the byword at Fram is *quality*. It's the kind of quality that comes from precise filtration engineering translated into vast production.

From these plants have come the Fram Firsts that advanced engineered protection for the products of the automotive industry. Fram quality has molded the decision of over 70 leading manufacturers of cars, trucks, tractors, buses and engines to use filters embodying the Fram Principle of Oil Filtration on some or all of their vehicles.

Bring your filtration problems to Fram. FRAM CORPORATION, Providence 16, R. I. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

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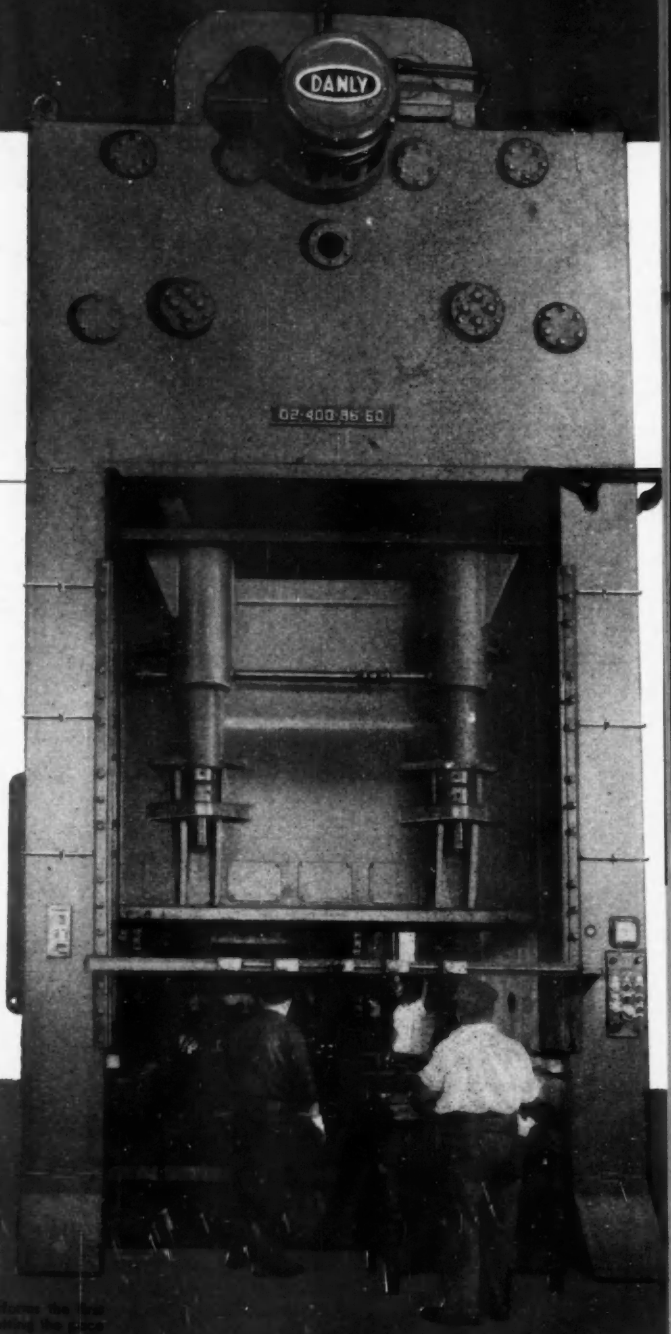
DANLY PRESSES

BUILT TO BEAT PRODUCTION RECORDS!



. . . at the Marion Industries Division of Motor Products Corporation, Marion, Ohio

Ability to meet emergency schedules . . . to keep running day after day under maximum load conditions . . . is built into every Danly Press. Exclusive design features like the Danly Cool-Running Clutch and extra rigid, precise construction throughout assure longer uninterrupted production runs—less down time for routine maintenance.

That's why you find more and more *complete lines* of Danly Presses in leading stamping plants like this. Smoother, quieter and easier to operate, Danly Presses are preferred by press room personnel too!

Call a Danly Engineer today and see how Danly Presses, engineered to meet your specific requirements, will make your press room more efficient.

DANLY MACHINE SPECIALTIES, INC.
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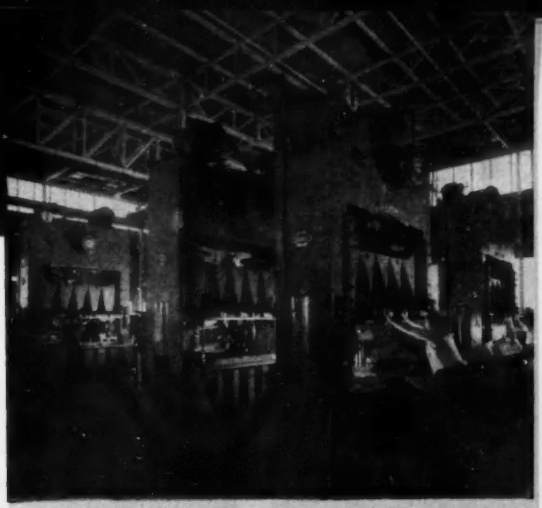
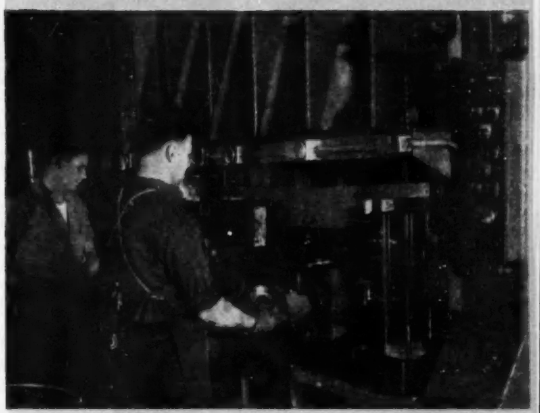
Mechanical Presses . . . 50 to 3000 tons

Straight Side · Autofeed · Gap Frame · Double Action · Underdrive



PRODUCTION FLOW . . .

where a sequence of stamping operations is performed continuously on a line, each press is vitally important. Every press in the two lines shown here is a Danly.



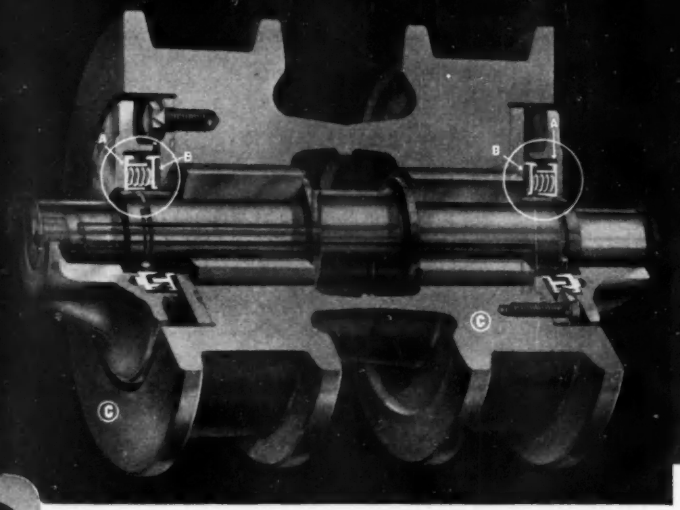
EXTRA SAFETY . . .

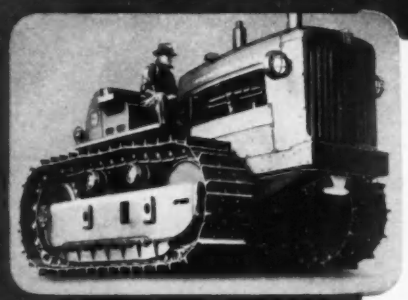
Danly Press Controls protect operators and equipment too. Here, two operators independently feed separate dies in the same press with maximum safety. In this setup, it is required that each operator engage two run buttons during most of the down stroke before the press will complete the cycle.

DANLY

IT COSTS LESS TO RUN A DANLY PRESS

THE SEAL OF COOPERATIVE RESEARCH





FROM KODIAK TO KARACHI IH CRAWLERS MUST ROLL WITH RELENTLESS DEPENDABILITY

PROBLEM: As International Harvester Crawlers roll through Arctic mud or burning sand, trackroller bearings must be continuously and effectively protected. The rollers which bear the full weight of the tractor rotate on stationary shafts mounted in a frame. These rollers, bearings and shafts are subject to great strain from various directions as the tractor rolls over uneven terrain.

Any intrusion of mud, dirt, water or sand would cause wear on the bearings and shafts. Efficient operation of the trackrollers requires the exclusion of all foreign material and retention of lubricant.

SOLUTION: C/R "Perfect" oil seal, (A), Type "VD" end face seal, mounted in a stationary housing which forms a cover for the shaft end. (B) The specially treated leather face of the seal operates in contact with a flat steel mating plate which rotates with the roller (C). These contact surfaces perform the sealing operation which excludes mud, dirt, water, sand and all road materials and retains bearing grease, a performance necessary for the relentless all-weather dependability of International Crawlers.

Solving tough or unusual sealing problems is C/R's specialty. That's why more automobiles, more agricultural and industrial machines are relying on C/R than any other sealing device.

CHICAGO RAWHIDE MANUFACTURING CO.
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P.S. For immediate delivery, C/R "Perfect" oil seals are stocked in over 1800 sizes covering 15 different types.

C/R Oil Seals

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Mechanical Leather Products
Boots, diaphragms, packings and other products give dependable service under difficult operating conditions.

SIRVENE
The Scientifically Compounded Elastomer
Custom-engineered and custom-built for critical service in aircraft, automotive and other mechanisms.

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Philadelphia • Pittsburgh • Cincinnati
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Minneapolis • Kansas City • Houston
Los Angeles • San Francisco

NEW PRODUCTS

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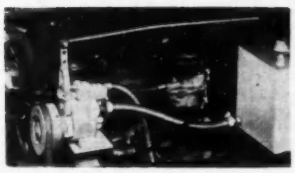
(*Continued from page* 124)

valves are being offered by American Industries Co., Bristol, Pa. Adaptable for aircraft applications, this control valve is capable of actuating two single-acting lifting cylinders and one double-acting cylinder. Control levers can be operated independently and simultaneously. Working pressures up to 1500 psi are readily attainable, with a capacity of six to 10 gpm.

K-36—Hydraulic Lift

National Lift Co., Waukesha, Wis., recently developed a hydraulic unit for installation on truck mounted snowplows. The manufacturer of the new hydraulic lift claims instant-acting control from a push-button on the dash.

It is actuated by a hydraulic pump operated by the engine fan belt. Further, according to the builders, the pump is equipped with a clutch which permits the pump to run only when power is needed. This clutch pump is also sold separately for remote control power.



National hydraulic lift mechanism.

K-37—Utility Cart

The Coleman-Pettersen Corp., Cleveland, Ohio, has announced the availability of the model no. 1016 utility cart which provides transportation as well as storage of small parts and supplies. Weighing 20 lb, this unit will support loads weighing up to 400 lb.

Measuring 50 in. overall, the model 1016 cart holds eight 25- by 29-in. trays spaced six in. apart. The size of the trays and the spacing between them can be varied to meet special needs. It is designed with a welded tubular steel frame construction and can be supplied with galvanized or painted finish. Trays can be fabricated of wire in any size, expanded metal, wire mesh, or sheet metal as desired. They can be removed and the frame folded flat for storage or stacking.

(*Turn to page* 130, *please*)

In Twin Disc Hydraulic Couplings, like the one used in Yale & Towne's "Diesel-Lift," the "double circuit" route which the fluid follows serves to balance the thrust load, increase the capacity for any given size.

Yale & Towne selected a *Twin Disc* Hydraulic Coupling to put the power to work on its *new* "*Diesel-Lift*" fork truck. And here's why:

This "double circuit" *fluid drive* eliminates chattering, stalling and lugging . . . eliminates, too, damaging starts and stops—and assures the *availability of full engine power* for heavy pulling and steep ramp work.

Cushioned power that *hangs* on . . . velvet glove power that permits the engine to work in its most efficient range *all the time* . . . these are the advantages you get with Twin Disc Hydraulic Couplings. And because these couplings are of "double circuit" design, thrust loads are fully balanced, and the coupling occupies less diameter per hp.

Chances are you, too, like Yale & Towne, will turn to Twin Disc Hydraulic Couplings for *new* performance characteristics from your equipment when you learn the complete story. Write today for Bulletin No. 144-C on fluid drives. No obligation.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin · HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND · DALLAS · DETROIT · LOS ANGELES · NEWARK · NEW ORLEANS · SEATTLE · TULSA

NEW PRODUCTS

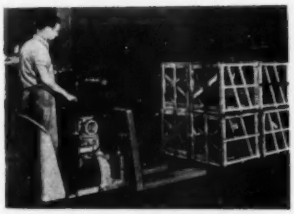
For additional information regarding any of these items, please use coupon on page 62

(*Continued from page* 129)

The model 1016 utility cart has two ball-bearing wheels made of durable composition rubber. Steel skid type front legs are utilized.

K-38—Lift Trucks

Increased horsepower for all models of the Truck-Man industrial truck has been announced by Truck-Man Div., The Knickerbocker Co., Jackson, Mich.



Truck-Man lift truck.

Now in production with the Wisconsin model AKN aircooled engine, the power change from 4.4 hp to 5.8 hp represents an increase of 32 per cent and the fourth step-up since 1946. There is an increase in displacement from 13.5 cu. in. to 17.8 cu in. Truck-Man is manufactured in hydraulically operated skid lift and pallet lift models, utility platform and tractor types, all with 360 deg steering and pneumatic-tired drive wheels.

• With every press on the foot pedal the Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches *two* rivets. 14-inch throat accommodates large assemblies. Handles 9/64" or smaller steel tubular rivets, 3/4" or less in length. Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility. For help with your specific fastening problem...send a sample of your problem assembly (or a blue print) for free fastening analysis.

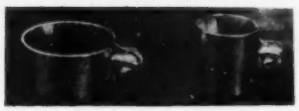
FREE CATALOG *contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.*

Chicago Rivet & MACHINE CO.

9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: Tyrone, Pa.

K-39—Tube Clamp



An improved AN741 type A and B standard tube clamp is now being manufactured by Production Products Co., a subsidiary of Standard Products, Inc., Wichita, Kansas. These standard clamps are available for immediate delivery in steel with zinc or cadmium plate; and in heat-treated aluminum or work-hardened aluminum with anodized finish. Sizes range from 1/2 in. to 2 1/2 in. diam. with 0.050-in. thickness in steel and 0.051-in. thickness in aluminum alloy. Production Products is also manufacturing the PP561 clamp (same as Curtis 561D or Consolidated S01001) with the same specifications as the AN741.

K-40—Lift Truck Remote Control

A remote control attachment for fork trucks has been developed by the Baker Industrial Truck Div., The Baker-Raulang Co., Cleveland, Ohio. The attachment permits the lifting and lowering action of the forks at a distance from the truck's control panel.

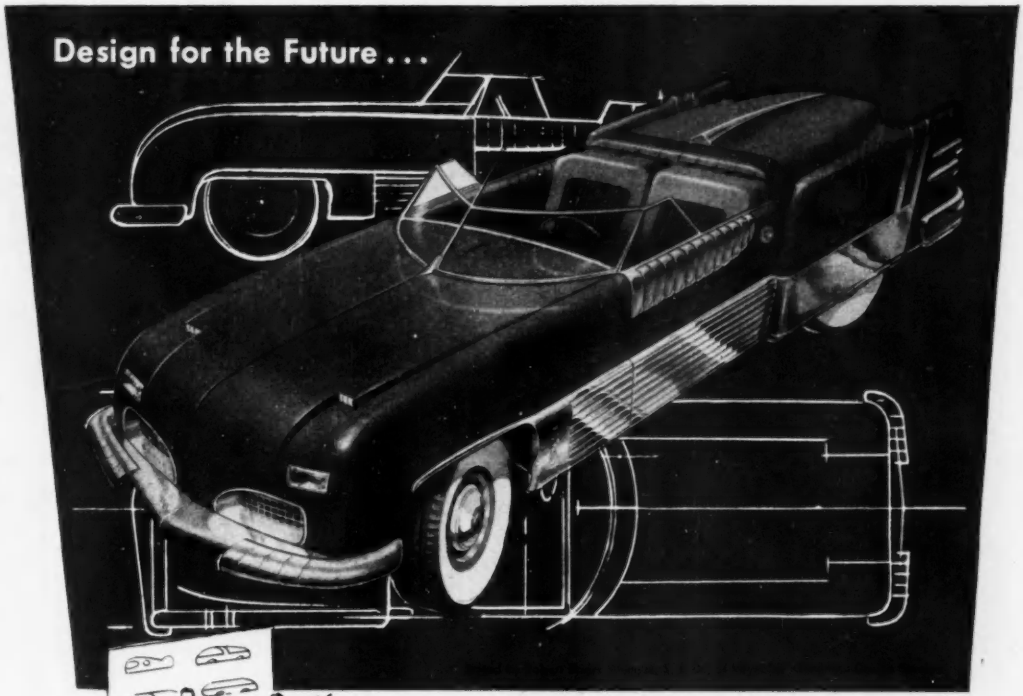
Lifting and lowering is controlled by the small remote control unit held in the operator's hand. During normal truck operation the remote control unit clamps over the tie bar on the truck's inner upright.

Cable for the remote control unit is housed in reels, under tension. Reels contain enough cable to allow unit to reach truck's standard lift limit.

All Baker fork truck models can be outfitted with the attachment.

(*Turn to page* 134, *please*)

Design for the Future . . .



To the Executive Planning for TOMORROW . . .

There's a lot of aluminum in the forecast designs for the 1960's. Even the more powerful engines are of aluminum . . . making these prototypes virtually all aluminum. And just as *today's* models include the features from forecast designs of a decade ago, items from present advance models will be used in *tomorrow's* production.

Why not take advantage of the benefits of aluminum in your future designs? Put aluminum on your drawing boards now. Supplies of bauxite ore are ample for generations and this, together with expanding aluminum production facilities assure a steadily mounting supply of *tomorrow's main metal*...at a consistently low price.

Reynolds Aluminum Specialists are now working with many companies on their future designs. They will be glad to work with your designers to assure you of the maximum benefits of aluminum—low cost, lightweight with strength, natural attractiveness, wide range of finishes, freedom from destructive rust, ease of fabrication.

For further information write to Reynolds Metals Co., 2587 S. Third St., Louisville 1, Ky.

BE SURE TO see The Kate Smith Evening Hour every Wednesday, NBC-TV, hear The Big Show with Tallulah Bankhead every Sunday, NBC Radio Network . . . consult newspaper for local time and station.

REYNOLDS METALS

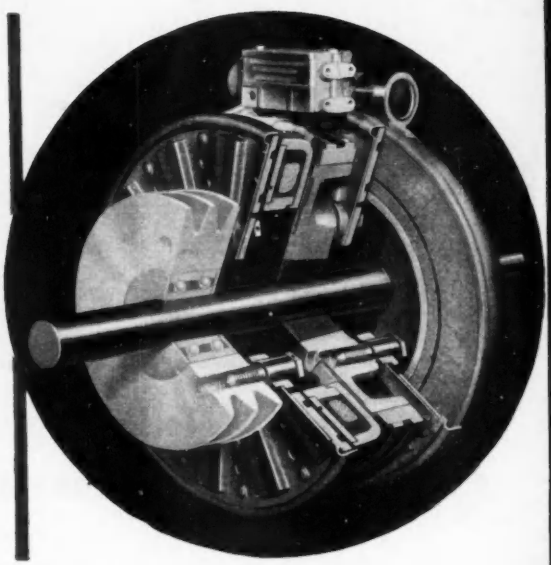
REYNOLDS ALUMINUM

Cincinnati Shaper reports simpler, faster, finger-tip control . . . with Warner electric brakes and clutches

electric motion control

gives these *5* new operating advantages:

- **ram positions more quickly . . . accurately**
- **stops and starts with light touch**
- **no grab . . . powerful, smooth action**
- **control more convenient to operator**
- **no adjustments required**

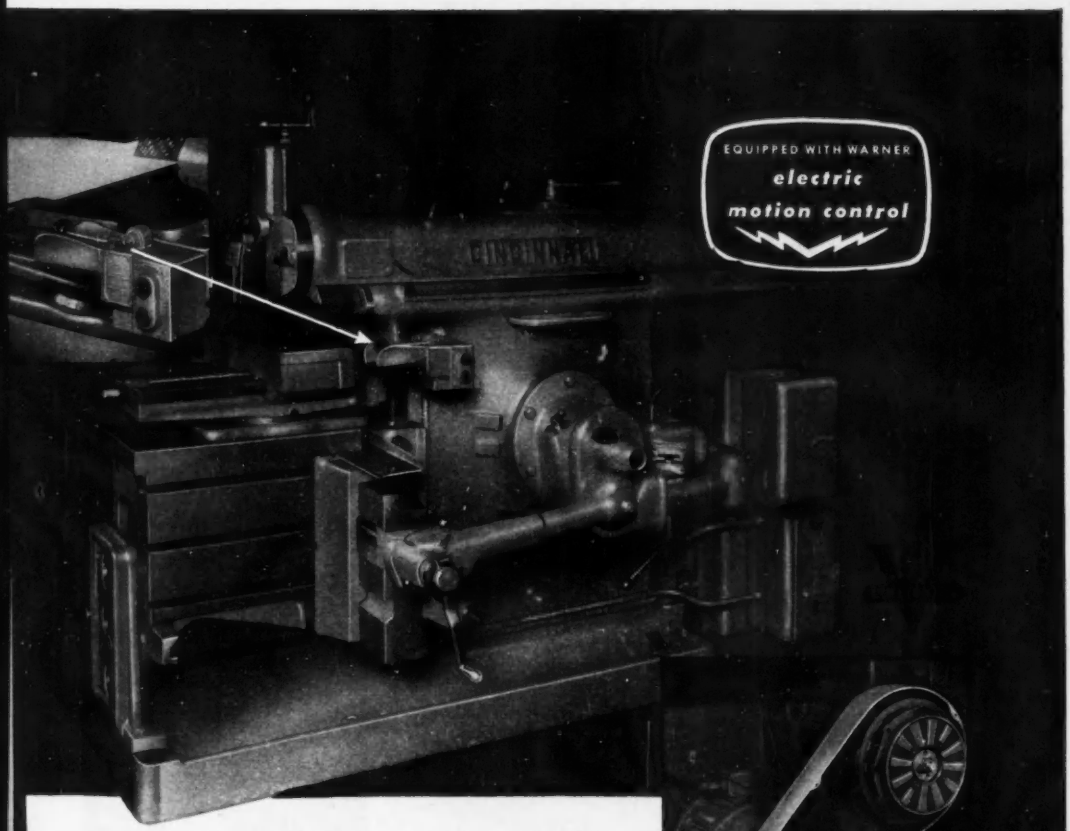


There's no slipping . . . grabbing . . . waiting . . . or reaching for levers when you set up a Cincinnati Shaper for a production run. These versatile machines are standard equipped with Warner *electric motion control*. You're sure to get instant response to operator's signals . . . controlled acceleration and deceleration . . . and convenient, finger-tip actuation of the Warner Electric Clutch-Brake. These are advantages that production men appreciate because they reduce operating costs. Also recognized are the *preventive maintenance* features of Warner units. These powerful clutches and brakes are so simple . . . only two main parts, magnet and armature . . . that no adjustment or maintenance is necessary. Torque remains constant throughout the operating life.

no linkage● lightning fast● push-button control● no adjustments● controlled torque● high heat dissipator● eliminates shock● fine-increment motion● no maintenance● easy to make automatic● more torque per size● low cost

ELECTRIC BRAKES & CLUTCHES

FOR INDUSTRIAL APPLICATIONS



• Warner Electric Clutch-Brake is mounted on main drive shaft of the Cincinnati Shaper. Only 30 watts of power are required. Control rheostat adjusts torque to any value desired. Simple control switch located at most convenient operator position.

Clutch-Brake is so compact almost entire unit is mounted inside drive pulley.

• Warner electric brakes, clutches and clutch-brakes produce more torque for their size and weight . . . are easily designed into original equipment. They may be operated individually or in combination, and are readily adapted to automatic cycling and remote, push-button control. Action is *controlled* and smooth . . . shock is eliminated . . . and torque is easily adjusted to fit the load. Extensively used on spindles, drive shafts and motors of all types of industrial machinery—practically anything that stops and starts.

COMPLETE ENGINEERING SERVICE . . . Warner offers complete application and design engineering service and field assistance. If you have a starting or stopping problem, consult Warner brake and clutch specialists for reliable recommendations on torque loads, mounting, electrical controls, capacity, etc.

Warner Electric Brake & Clutch Co., Dept. AI, Beloit, Wisconsin

☐ Please send your FREE Bulletin No. 703-A.

☐ Have your representative call to discuss my problem.

Firm Name_____

Individual_____ Title_____

Address_____

City_____ State_____

FOREWORD
Table of Contents
INTRODUCTION
1 HARD RUBBER
2 SPECIAL HARD RUBBER COMPOUNDS
3 IMPACT RESISTANT SEMI-RUBBER ALLOYS
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5 COVERINGS AND LININGS, HARD AND SOFT RUBBER
6 ACE THERMOPLASTIC MATERIALS
100th
ACE
HARD RUBBER & PLASTICS
HANDBOOK
AMERICAN HARD RUBBER COMPANY
NEW YORK, N. Y.
All pages of diagrams, illustrations and clearly written text — an easy, quick, technical reference for you!
A Bold Mine of Helpful Engineering Information about hard rubber and plastics.
new handbook
FREE TO PRODUCT DESIGNERS
● Here it is! The 100th Anniversary Edition of famous Ace Design Engineer's Handbook, thoroughly revised and enlarged. Now includes: tables of properties, tolerances, weights, many valuable pages on design techniques, inserts, assembly, machining and finishing of hard rubber and other Ace molded plastics such as Saran, polyethylene, acrylics, acetates, etc. Also covers rubber linings. Ask for your copy of this Hard Rubber and Plastics Handbook today.
100th ANNIVERSARY
American Hard Rubber Company
93 WORTH STREET · NEW YORK 13, N. Y.

NEW PRODUCTS

For additional information please use coupon on page 62

(*Continued from page* 130)

K-41—Starting Tool

A puncturing tool, for use with the primina system for Chevron starting fluid capsules, is being produced by The California Oil Co., New York, N. Y. Upper and lower chambers of the tool are protected by overlapping metal skirts. The tool is an aluminum die casting.

Another feature is a plug and screen trap at the end of the lower chamber which may be removed for cleaning. The plug is attached also to the tool and its mounting by a chain so it will not be lost if shaken loose by jars or vibrations.

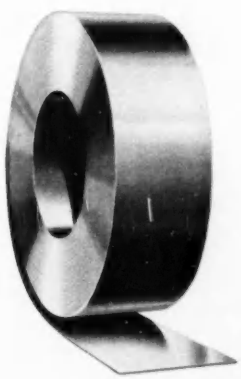
K-42—Lift-Truck Attachment

Marvel Industries, Inc., Evanston, Ill., has announced a Liftomatic power truck attachment for handling drums.

Made to fit any make power truck, the Liftomatic is mechanical and completely automatic. No additional power controls are needed, as pick-up and release are effected through raising or lowering the truck cylinder. Liftomatic allows transportation, tiering, and exact placement without the use of pallets or dunnage.

— another instance where

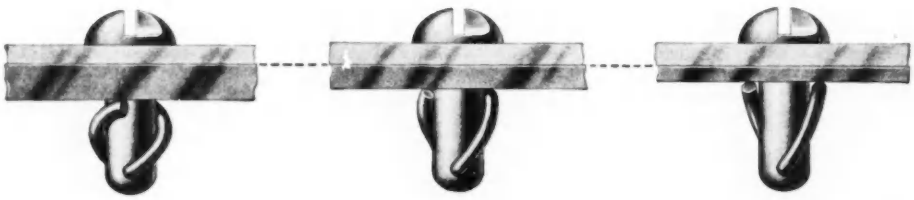
Superior Stainless *shines!*



The stainless steel windshield wiper on your car does a sparkling job when the going is wet . . . stays bright and rustless over years of exposure to the worst of weather . . . and is very likely to be made of SUPERIOR Stainless Strip Steel. As original equipment on a variety of cars, and sold by thousands of service stations, garages, car dealers and supply stores, windshield wiper arms and blades of Superior Stainless highlight in service the quality of their metal. ● Can we help you with *your* projected applications?

Superior Steel
CORPORATION
CARNEGIE PENNSYLVANIA

This fastener works through thick and thin!



Spring-Lock—the easy-to-use removable fastener for modern designs—works whether panel thicknesses run over or under specifications! Spring wire deflects automatically to handle greater or lesser thicknesses. Spring-Lock's design flexibility makes it more than a fastener: it can be adapted as a shelf support, door strike, knob or any similar panel-mounted device. Many standard shapes and sizes of Simmons Spring-Locks are available from stock.

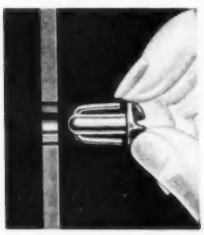
SIMMONS FASTENER CORPORATION

1749 North Broadway, Albany 1, New York

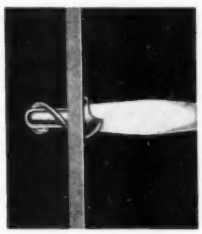
Simmons

Spring-Lock · Quick-Lock · Roto-Lock

HERE'S HOW SPRING-LOCK WORKS



1. *Insert fastener.*



2. *Half-turn locks it in place.*

With production costs on the uptrend, you can figure on Spring-Lock as an assembly time and money-saver, because:

- **Installation is BLIND**
- **Installation is EASY: no special tools are needed**
- **Installation is QUICK: a half-turn locks it in place**
- **Installation is SECURE: the *spring* steel *locks* the fastener, resists vibration**

Send for details and samples, or write us about *your* fastening problem.

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to November 13 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the December 15, 1951 issue, page 92, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration between November 13 and November 23.

Included in this latest tabulation, 4384 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being $10,490,497,793. These figures are exclusive of cases that are up for later review but included in this list — in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-off.

— A —

Allis-Chalmers Mfg. Co., Terre Haute, Ind.
Aircraft parts—$6,411,325 (65)

Aluminum Co. of America, Cleveland, Ohio
Aircraft parts—$337,500 (65)

— B —

Bendix Aviation Corp., South Bend, Ind.
Ordnance—$283,500 (65)

— C —

Caterpillar Tractor Co., Joliet, Ill.
Military earth moving equipment—$29,802,834 (50)

Caterpillar Tractor Co., Peoria, Ill.
Military earth moving equipment—$27,571,900 (50)

Certified Welders, Inglewood, Calif.
Aircraft parts—$4,960 (65)

Cleveland Graphite Bronze Co., McConnelsville, Ohio
Aircraft parts—$1,188,980 (65)

— D —

The Denison Engineering Co., Columbus, Ohio
Aircraft parts—$38,081 (70)

Draper Motors Corp., Centerline, Mich.
Ordnance—$150,845 (75)

— G —

General Metals Corp., San Francisco, Calif.
Diesel engines—$192,853 (50)

Greer Stop Nut Co., Chicago, Ill.
Aircraft parts—$641,000 (50)

— J —

J. O. Manufacturing Co., South Gate, Calif.
Aircraft products—$58,154 (70)

F. L. Jacobs Co., Detroit, Mich.
Ordnance—$90,148 (80)

Jenkins Brothers, Bridgeport, Conn.
Engine parts—$94,651 (75)

— K —

Walter Kidde & Co., Inc., Belleville, N. J.
Aircraft parts—$1,237,300 (60)
Aircraft parts—$506,446 (60)

— L —

Lee Plastics Co., Inc., Phila., Pa.
Helicopter parts—$20,275 (80)

Lempco Automotive, Inc., Cleveland, O.
Ordnance—$27,000 (65)

Lipe-Rollway Corp., Syracuse, N. Y.
Ordnance—$44,552 (65)

The Lynch Brothers, Inc., New Hartford, Conn.
Aircraft parts—$50,627 (50)

— M —

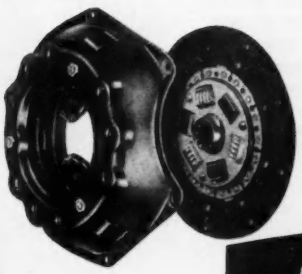
Mason Grinding Co., Los Angeles, Calif.
Aircraft parts—$16,917 (80)

(*Turn to page* 138, *please*)

You can depend on —

BORG & BECK®

CLUTCHES . . . for that vital spot where power takes hold of the load!



Engineered by BORG & BECK means . . .

CLUTCHES EXPERTLY DESIGNED AND PRECISION BUILT BY CLUTCH-MAKING SPECIALISTS!

BORG & BECK CLUTCH · THE STANDARD ·
Reg. U.S. Pat. Off.

ENGINEERING B-W PRODUCTION

BORG & BECK DIVISION
BORG-WARNER CORPORATION
CHICAGO 38, ILLINOIS

STRETCH-FORM

FOR STRENGTH AND PRODUCTION WITH . . .

BATH UNIVERSAL CONTOUR FORMERS

Now . . . aircraft components* can be formed at high production rate with the powerful **Bath** universal contour former. Blanks of any metal or alloy can be formed to extremely exacting tolerances in one operation. Forming bends of more than 360° and varying curves, *the* **Bath** *machine produces in one operation parts that previously were assembled from separate sections.*

Extruded, rolled, pressed or brake-formed cross sections in any length can be shaped on the **Bath** universal contour former. Twelve models are available with capacities ranging from 12½ to 150 tons to meet every metal contour forming requirement.

*Jet flange rings, shrouds, cases, flame tubes, stiffeners and casings formed in either full circles or segments.

CB THE CYRIL BATH COMPANY

6915 Machinery Avenue • Cleveland 3, Ohio

(*Continued from page* 137)

McBride & Shoff Machine Shop., Peoria, Ill.
Bogie wheel and shaft assem.—$17,625 (80)

Michigan Steel Casting Co., Whitehall, Mich.
Engine parts—$626,018 (65)

Miller Engineering Corp., Los Angeles, Calif.
Aircraft parts—$62,708 (80)

— O —

Olofsson Tool & Die Co., Lansing, Mich.
Aircraft parts—$10,000 (80)
Aircraft parts—$45,496 (80)

Olson Manufacturing Co., Worcester, Mass.
Aircraft parts—$119,400 (80)

— P —

Parcell & Bauer Products Co., Detroit, Mich.
Aircraft parts—$15,691 (65)

— R —

Raybestos-Manhattan, Inc., Stratford, Conn.
Ordnance—$89,373 (70)

— S —

Schindeler Mold Co., Huntington Park, Calif.
Aircraft parts—$15,064 (75)

Scott-Atwater Mfg. Co., Inc., Minneapolis, Minn.
Aircraft parts—$12,608 (80)

Sequoia Metalcraft Co., San Carlos, Calif.
Aircraft parts—$23,913 (65)

Simmonds Aerocessories, Inc., Vergennes, Vt.
Aircraft parts—$258,500 (70)

Standard Forgings Corp., Indiana Harbor, Ind.
Aircraft parts—$280,421 (65)

The Swan Tool & Machine Co., Hartford, Conn.
Aircraft parts—$29,701 (80)

— T —

Texlite, Inc., Dallas, Texas
Aircraft parts—$63,339 (75)

— U —

Unit Crane & Shovel Corp., West Allis, Wis.
Military earth moving equipment—$40,404 (60)

— V —

Vickers, Inc., Detroit, Mich.
Aircraft parts—$525,409 (65)

Vickers, Inc., Joplin, Mo.
Aircraft parts—$2,901,506 (65)

— W —

Wayne Wire Cloth Products, Inc., Kalkaska County, Mich.
Aircraft parts—$6,162 (75)

The Western Automatic Machine Screw Co., Elyria, Ohio
Aircraft parts—$178,765 (65)

Winters & Crampton Corp., Grandville, Mich.
Aircraft parts—$478,257 (65)

(*Advertisement*)

BUSINESS IN MOTION

To our Colleagues in American Business . . .

The fact that a Revere Distributor is now celebrating its 125th anniversary year is an indication of the service the company has given its customers through those years. It is also another proof of the essential function performed by distributors for American industry. Most goods, whether industrial materials such as copper and copper alloys, aluminum alloys, iron and steel, or consumer articles such as refrigerators, radio and television receivers, kitchen utensils and ranges, go through the hands of distributors. Generally speaking, only the large buyers are in a position to purchase direct from manufacturers, who do not find it economical to handle the smaller orders. Yet those orders when pooled in the hands of an organization set up to handle them attain sizable totals, and hence a good distributor account is exceedingly attractive to a large manufacturer such as Revere.

A distributor serves not only the factories from which he buys. He also performs an invaluable service to his customers by making quickly available to them the products they require. A machine shop, for example, may need only a few hundred pounds of brass rod; there is a distributor within easy reach who can furnish it almost immediately. Or a contractor may want a few pieces of steel pipe and a thousand feet or so of copper water tube. Again, the distributor has them. A metal products distributor has to carry such items and an infinite number of others. The Revere Distributor who started in business 125 years ago actually has in stock 53,000 different items, cataloged, indexed, and held in warehouses ready for immediate shipment throughout its territory. Each month this stock is drawn upon by 5,000 to 8,000 customers, each order relatively small. There are many Revere Distributors with similar stocks and offering equal service.

To keep this distributor's warehouses filled with a balanced inventory, 18 people are required in his purchasing staff, which includes specialists in various kinds of materials, machines, tools and supplies. And to serve customers with information, quotations and the like, 25 salesmen are on the go constantly, calling on manufacturers, contractors, builders and stores throughout the busy industrial area in which the distributor operates. The large business done by the company is in great contrast to that of 125 years ago, when it was little more than a hardware store. The enterprise has grown in the American tradition of freedom to prosper in accordance with the principles of reliability and efficiency, fair dealing and integrity in performing a desired function.

Revere Distributors are selected for their ability to serve, and also chosen as to location, so that no matter where you are in this big country of ours, there is a Revere Distributor within easy reach. Today metal stocks may be short due to defense demands but manufacturers are doing everything possible to keep distributors supplied.

If you buy from distributors we suggest you remember that they are not only "central stockrooms," but have a great deal of special knowledge about the products they sell and can give you much helpful advice. Not only that, through the Revere Distributors you can be put in touch with the Revere Technical Advisory Service, which will cooperate with you on matters concerning the selection and fabrication of the Revere Metals. Our distributors, and those of every other manufacturer, render many essential services, both to those to whom they sell, and to those from whom they buy. The distributor system as it operates in the United States arose in response to the need for it. Today it fulfills that need more effectively than ever before.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere

SEE "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

Fate?
No-NEGLIGENCE!

LET'S nail it down. Too many of the fires that cost industry millions of dollars every year *are* acts of negligence. Of putting off till tomorrow and then ducking the issue of proper fire protection.

In most plants—and this probably includes *yours*—there are operations, equipment and processes that are "key" hazards. Here fire can start fast or cause losses in equipment and production far beyond its immediate property damage. For such hazards only the most powerful specialized protection is sufficient.

To provide such protection CARDOX developed "Low Pressure Carbon Dioxide Systems"* years ago... made it practical to apply tons-a-minute of CARDOX CO_2 as readily as a few pounds, to stop big fires fast and keep small fires from becoming big. *By holding fire damage to a minimum and eliminating extinguishment damage entirely* CARDOX Systems have reduced industry's fire losses by many millions of dollars.

Why not let us show you how CARDOX can eliminate fire as a major threat to continuous operation? First step is a survey of your hazards and a frank report by a CARDOX expert. Please write us and we'll arrange it.

*Covered by Patents Issued & Pending

CARDOX

ORIGINATOR OF **Low Pressure CO_2**

FIRE EXTINGUISHING SYSTEMS

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

Offices in Principal Cities

Industry News

(*Continued from page* 23)

K-F Develops Solder Sealer for Bad Paint Conditions

Kaiser-Frazer Corp. has recently placed in production a paint technique, developed by its chemists, that is said to eliminate blistered or faded paint conditions around soldered areas on body sheet metal. A new type solder sealer, known as "Chrometeseal," is reported to fill solder cavities completely and resist chipping and flaking when baked. Furthermore, it is alleged to be available commercially in sufficient quantity at low cost and is capable of being readily applied on the production line.

When applied at the body-in-white line, Chrometeseal, which consists of a solution of phosphoric acid, distilled water, and isopropyl alcohol, and a paste of zinc dust, pigment zinc chromate, and isopropyl alcohol, acts as a cleaner as well as a cavity filler. According to reports, experimental production tests showed that the material reduced solder and paint imperfections from 80 per cent to a low of two per cent. Chrometeseal has been patented by K-F and will be produced commercially by a paint maker who will make it available to the industry.

NPA Limits Battery Output to Five Types

In an effort to conserve 5000 tons of lead in 1952, the National Production Authority has limited production of automobile batteries to five general types with ampere-hour ratings no lower than 90 and no higher than 135. The order applies to six-volt, lead-acid storage batteries, but does not include industrial storage batteries, nor batteries for motorcycles, tractors, buses, and heavy trucks.

The order generally limits battery manufacturers to the same number of each of the five types that they manufactured in the same months of 1951; it does, however, allow for adjustments to compensate for batteries that do not fall within the specification limits, if the manufacturer made such batteries last year. Thus, batteries of lower or higher ampere-hour capacity than specified may be added to the manufacturer's quota.

Trackson Co. Becomes a Caterpillar Subsidiary

Caterpillar Tractor Co. has announced that Trackson Co., Milwaukee, Wis., a producer of tractor-mounted machines, has become a wholly owned subsidiary. The firm's two plants occupy approximately 150,000 sq ft of manufacturing and office space.

(*Turn to page* 142, *please*)

No. 2-20
20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.
No. 2-20DS
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.
No. 2-20V
20" table travel . . . vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.
No. 1-14
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.
Speed up
YOUR MILLING!
Get top-speed milling with high accuracy . . . put the work on Kent-Owens Machines! They're outstandingly rugged . . . efficient . . . dependable. Designed with twin-post head mounting that assures balanced load—no chattering. Practical features throughout to help you produce more . . . save labor . . . reduce costs! Write for bulletins on wide range of hydraulic and hand-operated machines. Kent-Owens Machine Co., Toledo, Ohio.
No. 1-14DS
Double Spindle for two milling operations at same time . . . 14" table travel . . . 32" x 9" table.
KENT-OWENS REPRESENTATIVES
BOSTON
General Machinery Corp.
BUFFALO
Doe W. Paterson
CHICAGO
Neff, Kohlbusch & Bissell
DALLAS
Hunter Machine Tool Co.
DAYTON
Geniger Mach'y Company
DETROIT
A. C. Haberkorn Mach'y Co.
FT. WAYNE
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GRAND RAPIDS
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F. F. Barber Mach'y Company
HARTFORD
Harrington-Wilson-Brown Co.
HOUSTON
Oliver H. Van Horn Co., Inc.
INDIANAPOLIS
Oasis Machinery Co.
KANSAS CITY
Bichman Machinery Co.
LOS ANGELES
Beeles & Germain Mach'y Co.
MILWAUKEE
Neff, Kohlbusch & Bissell
MINNEAPOLIS
The Satterlee Company
MOLINE
John J. Normyle Co.
MONTREAL
F. F. Barber Mach'y Co.
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NEW YORK
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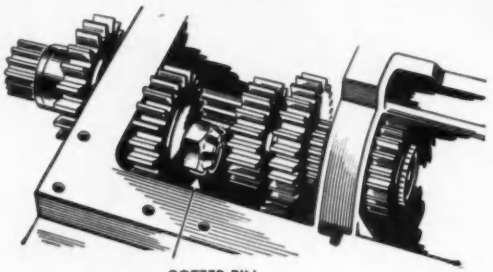
Calco Machinery Company
PITTSBURGH
Barney Machinery Company
ROCHESTER
F. W. Schiefer Machinery Co.
SAN FRANCISCO
C. P. Buteni Machinery Co.
ST. LOUIS
Blackman & Nuetzel Mach'y Co.
Clarke Equipment Company
SYRACUSE
J. P. Owens Mach'y Company
TORONTO, ONT.
F. F. Barber Mach'y Company
WALKERVILLE, ONT.
F. F. Barber Mach'y Company
No. 1-M
Hand feed to table and head . . 25" x 9" table . . . Adjustable head-counter-balance.
KENT-OWENS
Milling Machines
No. 1-V
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.
No. 1-8
8" table travel . . . 25" x 9" table . . . automatic hydraulic table feed.

(*Advertisement*)

Fastener Problem of the Month

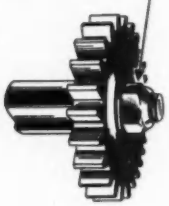
FASTENING GEARS JANUARY, 1952



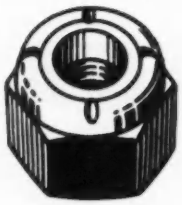
COTTER PIN

PROBLEM—In designing a gear assembly for a new transmission, or a gear reduction unit, designers encounter the age-old problem: How to securely fasten gears to the end of shafts. The gear must be fixed firmly and accurately in place, so operating vibration and repeated impact loadings will not shake the fastener and the gear out of position. A castellated nut and cotter pin used to be the only answer. But this method does not assure accurate adjustment or easy maintenance.

ELASTIC STOP NUT



SOLUTION—At the suggestion of ESNA engineers, the designers decided to fasten this gear by means of a standard vibration-proof Elastic Stop Nut. This nut is simply wrenched into position with no extra steps for locking and adjusting. There is no need to match a hole in the shaft with cotter-pin hole—no danger of cotter pin pieces flying into the gears. And Elastic Stop Nuts remain just as secure when immersed in oil and exposed to operating temperatures up to 250°F.



ESNA HEX NUT

YOUR FASTENER PROBLEM may have a solution as easy as this simple hex-nut application, or it may require one of the special types of Elastic Stop Nuts. But—if it involves vibration—don't hesitate to call in your nearest engineer, or mail the coupon to Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.

Dept. N2-15
Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free information

☐ Elastic Stop Nut Bulletins ☐ Rollpin samples and booklet
☐ AN-ESNA Conversion Chart ☐ Here is a drawing of our product. What vibration-proof fastener would you suggest?

Name Title
Company
Address
City Zone State

Industry News

(*Continued from page* 140)

Ford Program Cuts Use of Critical Materials

Efforts of the Ford Motor Co. engineering, manufacturing, and purchasing departments in 1951 are said to have made available for the defense effort more than 10 million lb of basic materials in short supply. In addition, it is reported that Government-imposed reductions in automobile and truck output freed 1.5 billion lb of critical materials for use in making military supplies. It is claimed that the success of the materials conservation program resulted from an integrated and extensive program of substitution and replacement.

Materials used as replacements for such scarce metals as aluminum, copper, nickel, and zinc were required to meet rigid manufacturing standards and, in many cases, resulted in greatly increased costs. For example, five lb of aluminum were saved on each Fordomatic and Merc-O-Matic transmission through redesigning and reengineering. This saving, combined with others in passenger car parts, allegedly effected a total saving of 2.5 million lb of aluminum during the year.

Zinc usage was reduced from 30 lb per car to 24 lb by using steel stampings or iron castings for parts which formerly were made from zinc die castings. This replacement program made more than 3.5 million lb of zinc available for the defense program last year.

Other intensive research-replacement programs resulted in savings of three million lb of copper and 500,000 lb of nickel, in addition to substantial savings in other critical materials such as molybdenum and cobalt.

Dewar Trophy Awarded to Jaguar Cars, Ltd.

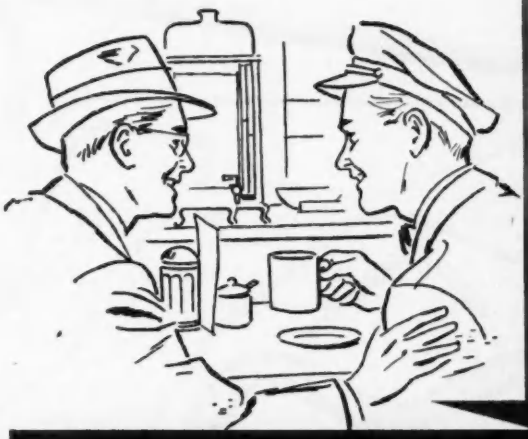
Jaguar Cars, Ltd., was recently awarded the Dewar Trophy for the most outstanding engineering and technical achievement during 1951. The trophy was presented by the Royal Automobile Club in recognition of the firm's notable record in various racing competitions.

Bearing Trade Association Formation is Announced

A new trade organization of national scope, known as the Association of Bearing Specialists, has been incorporated under the laws of Illinois. The membership is composed of concerns whose primary function is supplying ball and roller bearings to the industrial trade for maintenance. The organization's first meeting was held recently in Houston, Tex.

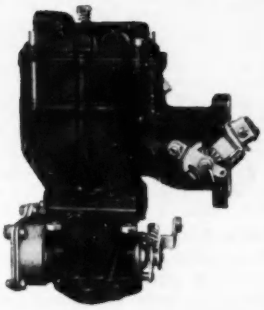
(*Turn to page* 146, *please*)

Does He Knock or Boost Your Truck?



IT ALL DEPENDS ON PERFORMANCE and PERFORMANCE DEPENDS ON

Zenith CARBURETORS



What drivers and operators say about your vehicles has a mighty important bearing on the future of your business. So it is imperative that every component be selected on the basis of its contribution to lasting, satisfactory performance. In the field of heavy duty carburetion Zenith* has long been recognized as the engineer's choice for quality performance under all operating conditions. You can be sure that manufacturers whose vehicles are Zenith equipped measure carburetor costs in lasting terms rather than initial expense. Zenith's rugged construction, strong idling, freedom from stalling and obedient response to every power demand goes a long way toward building owner good will. That's why cost conscious operators and experienced drivers prefer Zenith equipped vehicles.

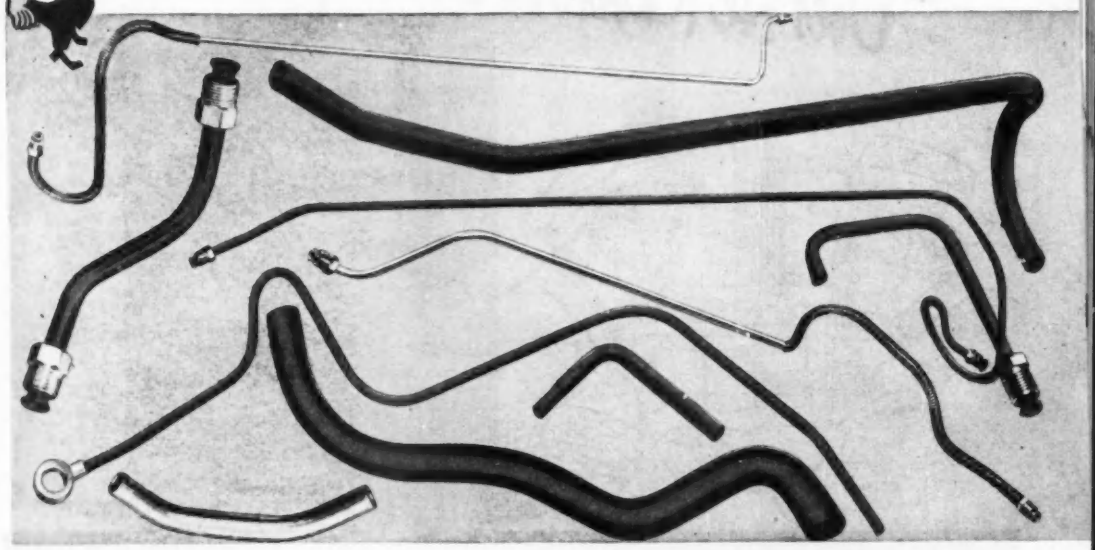
*REG. U.S. PAT. OFF.

ZENITH CARBURETOR DIVISION OF
696 Hart Avenue · Detroit 14, Michigan

Bendix
AVIATION CORPORATION

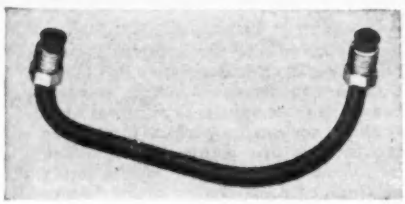
Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

Your greatest automotive



COSTS CUT

You save in the constant search for lowered production costs on your specific automotive part at Bundy. Fabricating the bead and bend in oil level indicator above formerly required two separate operations. Now the two are combined in one Bundy-engineered step, and costs of unit reduced accordingly.



PRODUCTION SAVINGS

You save in the continual improvement of basic production steps within Bundy, as well. Assembly of flare nuts in end-to-end alignment on tubing lengths, as above, formerly a tedious hand operation, is now expedited by Bundy-developed automatic nut assembler. Savings go right on to Bundy customers.

FABRICATION SAVINGS

Shooting for lowered manufacturing costs, better automotive performance in your new designs? Bundy engineers can help work out the easiest, most practical ways to fabricate new lines and tubing parts in double-walled Bundyweld. Often make substantial *extra* savings by showing how to use less tubing, where to take production short-cuts. You save because Bundy men "can do!"

PERFORMANCE SAVINGS

You save, too, with Bundyweld's dependable, trouble-free, *safe* performance the life of your automotive equipment. Sturdy, more resistant to failure from vibration, extra-rugged and -strong, Bundyweld is used in the fuel, oil and brake-line systems of 95% of today's cars . . . evidence of its dependability.

tubing buy on every count

Tubing features second to none, priceless, time-proved, safe performance, plus engineering skills that cut costs to the bone, *yours* when you specify Bundyweld Tubing

When specifying tubing for brake lines and other automotive applications, look beyond the question of cost-per-foot. Look at *all* that you buy in Bundyweld Tubing

In the last 20 years, 360,000 miles of Bundyweld Tubing have been used in the brake-line systems of cars, trucks, tractors and buses in all price ranges. You buy *safety*, proved in the billions of miles traveled by these vehicles.

Here is the only tubing double-walled from a single strip, copper-bonded through 360° of wall contact. No other tubing has all of Bundyweld's features because of this one-of-a-kind design. Bundyweld is extra-sturdy and -strong, highly resistant to brutal shock and vibration fatigue. You buy the world's finest automotive tubing, feature-wise.

Bundyweld hits your assembly lines clean as a whistle inside and out . . . as specified, and on time. Either prefabricated by Bundy, or in lightweight, easy-handling lengths ready for fast, economical fabrication by your men. In fabrication, in deliveries, you buy unsurpassed engineering skills and services that mean savings in the long run.

Price-conscious, or performance-conscious—or both—the world's finest automotive engineers know there is no adequate substitute for Bundyweld Tubing.

There can't be. No other tubing is like it.

Contact a Bundyweld Distributor listed below, or write direct to *Bundy Tubing Company, Detroit 14, Michigan*

Bundyweld® Tubing

–DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

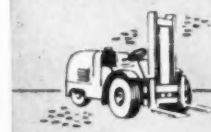
passed through a furnace. Bonding metal fuses with basic metal, presto—

Bundyweld . . . double-walled and brazed through 360° of wall contact.

NOTE the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: *Cambridge 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • *Chattanooga 2, Tenn.:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • *Chicago 32, Ill.:* Lapham-Hickey Co., 3333 W. 47th Place • *Elizabeth, New Jersey:* A. B. Murray Co., Inc., Post Office Box 476 • *Philadelphia 3, Penn.:* Rutan & Co., 1717 Sansom St. • *San Francisco 10, Calif.:* Pacific Metals Co., Ltd., 3100 19th St. • *Seattle 4, Wash.:* Eagle Metals Co., 4755 First Ave. South *Toronto 5, Ontario, Canada:* Alloy Metal Sales, Ltd., 881 Bay St. • Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.

GEARS *by Fairfield*



A Plus Value in Any Product!

IF GEARS are a part of the machines you make, there is no finer recommendation for YOUR PRODUCT than to be able to say it is "Equipped with FAIRFIELD GEARS!"

At Fairfield, your gears are in the hands of specialists equipped with every modern facility for producing fine gears efficiently and economically. *For the Best in Gears, Specify Fairfield!*

Gears made to order:

SPUR • HELICAL • HERRINGBONE • SPIRAL BEVEL
STRAIGHT BEVEL • HYPOID • ZEROL • WORMS and
WORM GEARS • SPLINED SHAFTS • DIFFERENTIALS

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MANUFACTURING CO.
319 So. EARL AVE.
LAFAYETTE, IND.

Send for Illustrated Brochure

Industry News

(*Continued from page* 142)

DPA Forecasts Military Need for Certain Types of Metals

Defense Production Administrator Manly Fleischmann recently stated that beginning in the first quarter of 1952 direct defense and defense-related production and construction will take more than 40 per cent of the carbon steel and about 60 per cent of the supplies of aluminum and copper wire mill and copper brass mill products. These estimates, prepared by DPA's Office of Program and Requirements, were said to reflect the greatly increased needs of the military as the defense program gets into full swing.

On the brighter side of the metals picture, DPA told manufacturers that a sizable supply of straight chromium is now available and announced that an additional 37,500 tons will be made available for civilian production in the first quarter of 1952. This amounts to approximately 26 per cent of the total supply of stainless steel.

Copper Production Seen As Being on the Rise

In a year-end statement issued recently, James J. Russell, chairman of the board, Revere Copper and Brass, Inc., stated that estimated world copper production in 1951 on a mine basis was 2,238,000 short tons, compared with 2,103,273 in 1950. U. S. 1951 production was estimated at 950,000 tons, compared to 915,446 in 1950. Although nine major mining projects are scheduled for development in the U. S. to add 256,000 tons of annual capacity, there will be some losses from old mines; therefore, 1955 U. S. production is estimated at only 200,000 tons greater.

Russell also announced recently that Revere will extend its aluminum operations to the West Coast by approximately doubling the size of its Los Angeles, Calif., plant. This facility is currently fabricating only copper and copper alloys.

Magnaflux Presents New Line of Inspection Equipment

Magnaflux Corp. has announced a full new line of equipment for magnetic particle inspection. In most cases, the new units are larger than the old ones at comparable price—from 48 in. old to 54 in. new capacity, and from 72 in. old to 96 in. new. It is claimed that the new units can handle a greater variety of parts for inspection. They are now built for either 220 or 440 volts, 60 cycle, interchangeably. Maintenance has been reduced and simplified.

(*Turn to page* 148, *please*)

"Our 350 units get rugged service...

their fine performance wouldn't be possible except with

Wagner Air Brakes"

says R. A. Baensch, Executive Vice Pres.
DECATUR CARTAGE COMPANY

You, too, will find—if you equip the vehicles you manufacture with Wagner Air Brakes—maintenance will be no problem for the users. Reason—they require less maintenance than ordinary air brakes because of such engineering achievements as the Wagner Rotary Air Compressor, and the Wagner Power Cluster. Then, too, when maintenance becomes necessary, it can be quickly and economically handled because everything in the system is of simple design. As an example—the air compressor can be disassembled, serviced and put back in a few hours.

It will pay you to investigate the many advantages of Wagner Air Brakes as standard equipment on the vehicles you are manufacturing. Write for copy of Catalog KU-201 and complete information. Coupon below is for your convenience.

users are our biggest boosters

MODERN EQUIPMENT • DEPENDABLE • BONDED

DECATUR CARTAGE COMPANY
Chicago 16
TWENTIETH STREET AND WENTWORTH AVENUE

August 20, 1951

Wagner Electric Corporation
2411 S. South Park
Chicago, Illinois

Gentlemen:

I have just been complimenting our Maintenance Department on the fine performance of our tractors and they told me, very bluntly, that it was about time we complimented Wagner Electric Corporation on their Air Brakes. We haven't had a single case of road failure because of this equipment since we have been buying "Wagner"

The Rotary Air Compressor was the feature that originally sold us on trying your product and we have found these Brakes troublefree and requiring a minimum of maintenance.

Likewise, we have found your Air Brakes simple and easy to install. These features have influenced us to specify "Wagner" on any new additions to our fleet.

Our 350 units, as you well know, get rugged service and the fine performance of our trucks wouldn't be possible except with Wagner Air Brakes.

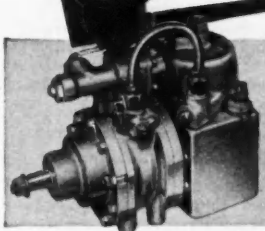
Yours very truly,

DECATUR CARTAGE COMPANY

R. A. Baensch
Executive Vice President

RAB:sr

BLOOMINGTON CHAMPAIGN CHICAGO CINCINNATI CLEVELAND COLUMBUS
JO JOLIET KANKAKEE MUNCIE OTTAWA PARIS PEORIA PONTIAC QUINCY



used as original equipment by truck, tractor, and bus manufacturers

Wagner Products Serve the Automotive and Electrical Industries

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID
NoRoL . . CoMaX BRAKE LINING . . AIR BRAKES . . TACHOGRAPHS
ELECTRIC MOTORS . . TRANSFORMERS . . INDUSTRIAL BRAKES

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CITY_____ STATE_____

KBI-1A

GET YOUR COPY OF THE NEW Wagner Air Brake DESCRIPTIVE CATALOG NOW!

"RUDOLPH SAYS HE KNOWS THE TAPS WOULD LAST LONGER IF HE HAD THE RIGHT CUTTING FLUID ON THE MACHINE!"

USE OF the *right* cutting fluid for the job *makes taps last longer,* conserves critical tool steel, minimizes down-time, increases output. A typical example:

A large instrument manufacturer changed to Stuart's THREDKUT for tapping Allegheny metal.

	Before Using ThredKut	After Using ThredKut
Tap Life	2 hours	8 hours
Production	180 holes per hour	400 holes per hour

You just cannot ignore the fact that the cutting fluid used is a major factor in any machining operation. A Stuart Representative is prepared to show you how Stuart combines theory and practice to give you better operating performance. Ask to have him call.

Are you receiving Stuart's Shop Notebook regularly? Write, wire or phone.

CONSERVE TOOLS
Use the Right Cutting Fluid

STUART SERVICE
Goes with every Barrel

D.A. Stuart Oil Co.
2733 S. Troy St., Chicago 23, Illinois

Industry News

(*Continued from page* 146)

Rubber Supply Ample to Meet 1952 Demand

Rubber appears to be one bright spot in an economy otherwise badgered by shortages of practically all basic materials. Although the rubber industry during 1951 consumed a near record 1,235,000 long tons of new rubber, the rapid reactivation of Government-owned synthetic rubber plants last year flooded more than three-quarters of a million tons of new synthetic rubber into the industry's production lines to bridge the gap between the supply of natural rubber and demand. In fact, output of synthetic rubber and the supply now is so good that the Commerce Dept. will license export of about 10,000 long tons in the first quarter of this year.

Currently American plants producing man-made rubbers are operating at the rate of more than 930,000 long tons a year. It is estimated that this year total rubber consumption will range between 1.2 and 1.3 million tons of all types, with about 65 per cent of the total coming from synthetic rubber plants.

According to John L. Collyer, president of B. F. Goodrich Rubber Co., the nation has enough of both crude and man-made rubber to meet all essential needs for a five-year all-out war. He estimates that about 73 million passenger car tires will be produced this year to top the 1950 level by six million units. Since the demand from automobile manufacturers for tires will be lower than last year because of reduced production, between eight and 10 million more replacement tires will be available for passenger cars in 1952.

E. W. Bliss Awarded a Contract for Brazilian Mill Equipment

E. W. Bliss Co. has announced the award of a $500,000 contract for the design and manufacture of hot strip mill auxiliary equipment in the Volta Redonda, Brazil, plant of Companhia Siderurgica Nacional (National Steel Co. of Brazil). The contract, which covers a hot strip mill coiler, conveyors, tables, and hot coil handling equipment, is part of a vast expansion program now in process by the Brazilian firm.

Midwest Power Conference Is Given New Designation

Illinois Institute of Technology has announced that the Midwest Power Conference has been renamed the American Power Conference to describe its character and scope more accurately. The first annual conference of the new organization will be held March 26 to 28, in Chicago, Ill.

(*Turn to page* 150, *please*)

. . . IN DEFENSE PRODUCTION!

Aircraft engine parts, shells and shell casings, rockets and many other items for defense use.

Wheels, brakes, hubs and drums for cargo trailers, troop carriers, tanks, gun carriages, etc.

Electric brakes, brake power equipment, power chambers and valves for all military vehicles.

. . . IN PEACE TIME PRODUCTION!

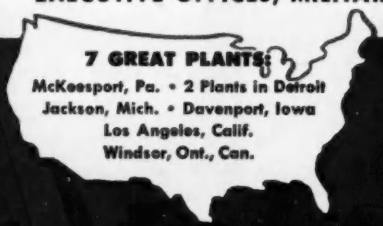
Wheels, brakes, hubs and drums for passenger cars, buses, trucks and tractor-trailer combinations . . .

Electric brakes, brake power equipment, power chambers and valves for civilian vehicles . . .

Complete foundry, machining, pressed metal stamping, testing, inspection and engineering development facilities.

KELSEY-HAYES WHEEL COMPANY

EXECUTIVE OFFICES, MILITARY AVENUE • DETROIT 32, MICHIGAN



MAINTAIN PEAK OUTPUT with Pheoll precision-made screws, bolts and nuts—they will speed your assembly work and improve product appearance.

INSURE PRODUCT PERFORMANCE with Pheoll quality screws, bolts and nuts—standardize on these dependable industrial fasteners.

HUGE MANUFACTURING FACILITIES assure rapid production of both standard and special fasteners.

SINGLE SOURCE OF SUPPLY for screws, bolts and nuts in different sizes, types and metals.

OVERNIGHT DELIVERY to principal cities from centrally-located Pheoll factory and warehouses.

FACTS ABOUT Pheoll YOU SHOULD KNOW

- One of the nation's leading producers of industrial fasteners.
- Pheoll products are widely used in part assembly when quality is of prime importance.
- Men who produce Pheoll industrial fasteners are highly trained and experienced craftsmen.
- All products are manufactured under rigid quality control standards.
- Constant product inspection from laboratory metal analysis, through production and final finish is your assurance of precision made, trouble-free screws, bolts and nuts.

Write for this free Bulletin

Pheoll MANUFACTURING COMPANY
5700 ROOSEVELT ROAD
CHICAGO 50, ILLINOIS
SCREWS • BOLTS • NUTS
Industrial Fasteners and Holding Devices

Industry News

(*Continued from page* 148)

GM and Ford Aid Study of Machine Computing

Typical of the growing trend of cooperation between industry and education is the recent announcement that General Motors Corp. and Ford Motor Co. have made grants totaling $200,000 for expansion and maintenance of a large-scale computing machine laboratory at Wayne University, Detroit, Mich. A grant of $150,000 from GM will be used to acquire a large-scale computing machine, which will be built by Burroughs Adding Machine Co. of Detroit at the cost of labor and material. The $50,000 Ford grant will be used for operating expenses of the expanded laboratory.

It is believed that the machine will be helpful in solving problems of vibration, noise, and structural strength in automobiles, which previously had to be solved by trial and error methods on the test track.

Motor Vehicle License Plates Nixed for 1953

In a move reminiscent of World War II days, the National Production Authority has banned manufacture of new automobile license plates for 1953. Instead, the agency will allocate materials to each state for manufacture of clip-on tags or other similar products to re-validate 1952 license plates for use next year. NPA estimates that the action will save about 80 per cent of the steel and aluminum normally used for manufacture of full-sized plates.

MPR-Thompson Products Merger Again Deferred

The proposed merger of Muskegon Piston Ring Co. and Thompson Products, Inc., again has been deferred for further study. Stockholders of Muskegon had approved the move but, after an opinion from the Justice Dept. that the merger might be inconsistent with anti-trust laws, further action was postponed. Muskegon stockholders now have voted to wait until April 15 before taking any further action, and the management of Thompson is still studying the legality of the proposed merger.

Twin Coach Co.'s Aircraft Div. Due for More Defense Contracts

According to reports, Aircraft Div., Twin Coach Co., is in line for a couple of new defense orders. At the present time, it is producing wing sections for Grumman planes and fuselages for Piasecki helicopters, and there is every expectation that the forthcoming contracts will cover similar lines.

(*Turn to page* 152, *please*)

PAGE WIRE

LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON

You draw the Shape —Page can draw the Wire

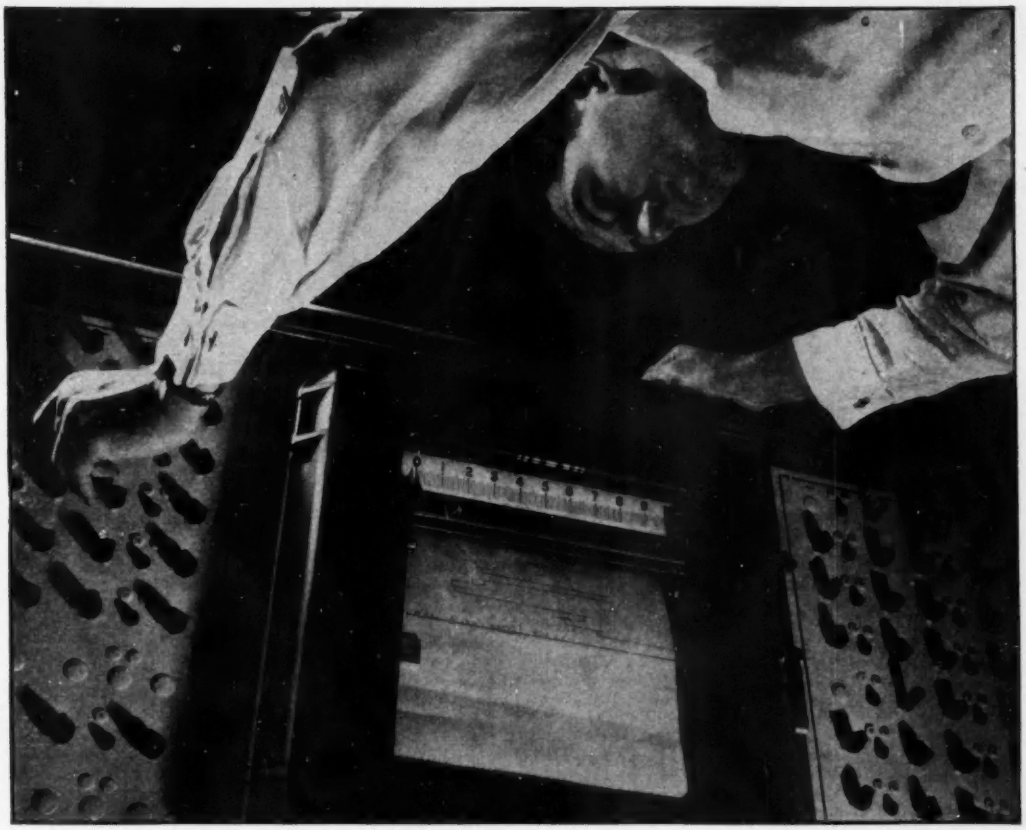
—the way you want it for your production—whether it's ALL of your product, or only a part. Cross-sectional areas up to .250" square; widths to ⅜"; width-to-thickness ratio not exceeding 6 to 1.

for Wire or Information about Wire—

Get in touch with Page!

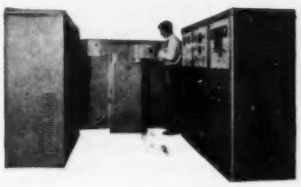
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.



RIGHT from the start . . .

Expert scientific control makes ALUMICAST castings faultless



Illustrations above show the Quantometer which provides our laboratory technicians with a graphically recorded analysis of sixteen different elements—in less than three minutes. This assures the correct casting alloy composition in every "heat". You benefit because of expert scientific control ("E.S.C.").

There's no guesswork done at ALUMICAST. Every step from ingot to the finished casting is subject to scientific tests and controls to assure production of uniformly high quality castings. Right from the start every piece will meet your specifications.

No matter where you are located, you will find ALUMICAST a quick and dependable source for aluminum or magnesium castings. You are cordially invited to consult us relative to your civilian or defense needs.

ALUMICAST CORPORATION, 1521 N. Kilpatrick Avenue, Chicago 51, Illinois.

ALUMICAST

ALUMINUM and MAGNESIUM PERMANENT MOLD and DIE CASTINGS

"E.S.C." EXPERT SCIENTIFIC CONTROL

for
custom-engineered
POWER

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Since 1909, the job of The Electric Products Company has been to create and develop special electrical rotating equipment . . . motors and generators to do existing jobs better or to reach into new fields to do jobs that couldn't be done before. The natural "by-product" of our more than 40 years of specialization is that you get equipment designed and built to the exact requirements of your application . . . equipment that has greater dependability, longer life and that requires less maintenance.

Send in the coupon below for detailed information about our Custom-Engineered synchronous motors and generators . . . d-c motors and generators . . . induction motors . . . battery chargers . . . frequency changers.

A nation-wide sales engineering and service organization stands ready to meet all User requirements.

THE ELECTRIC
PRODUCTS COMPANY

1725D CLARKSTONE ROAD
CLEVELAND 12, OHIO

Attach coupon to your letterhead for your copy of Bulletin 2-200

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TITLE_____
COMPANY_____
STREET_____
CITY_____ ZONE____ STATE_____
X-74

Industry News

(*Continued from page* 150)

1951 Seen As Boom Year by Dept. of Commerce

In an year-end review of the economic situation issued recently, Secretary of Commerce Charles Sawyer stated that the volume of national output increased by about eight per cent in 1951 over 1950 and was higher than that of any other year. The value of output of final goods and services (the gross national product) totaled $327 billion, or 15 per cent more than in 1950.

Industrial production was 10 per cent higher in 1951 than in 1950, with defense expenditures doubling from $20 billion in the fourth quarter of 1950 (at the annual rate) to more than $40 billion in the final quarter of 1951. At the end of the year, outstanding defense orders amounted to around $40 billion, with another $33 billion in unobligated funds.

Breech Sees Controls Need Eased by 1953

If the international situation does not get any worse, a reasonable expectation is that most of the present Government controls may be unnecessary some time in the first half of 1953, according to E. R. Breech, executive vice-president of Ford Motor Co. In a year-end statement, he said that 1951 was a year of readjustment which saw Ford's production drop 419,905 units under the 1950 level. He added that there is every indication that production in 1952 will be 40 per cent or more below the all-time high level of 1950.

Nash Profit Shows Sharp Decline

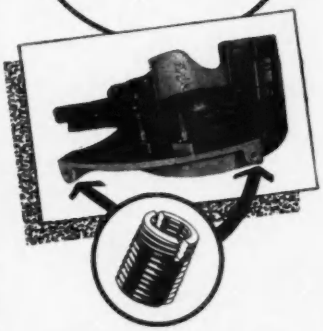
Although net sales of Nash-Kelvinator Corp. for the 1951 fiscal year were only six per cent under the all-time high set in the previous year, net earnings showed a decline of 44 per cent. Profit for the year ended Sept. 30 was $16,220,173, compared with $28,836,326 in the 1950 fiscal year. George W. Mason, president, said the decline was due principally to the effects of price controls, higher material and labor costs, and greatly increased income tax rates.

Chicago Metal Hose Changes Its Name

On Jan. 1, 1952, its 50th anniversary, Chicago Metal Hose Corp., changed its name to Flexonics Corp. The company manufactures more than 150 parts, including aircraft parts and assemblies, pipeline expansion joints, instrument control bellows, and automobile thermostats, in addition to all types of flexible metal hose.

TAP-LOK INSERTS

strengthen power tools--Chain Saws, for instance



THIS magnesium die cast housing is part of the Chain Saw manufactured by Homelite Corporation. Such tools must be strong in every part, to withstand rigorous use.

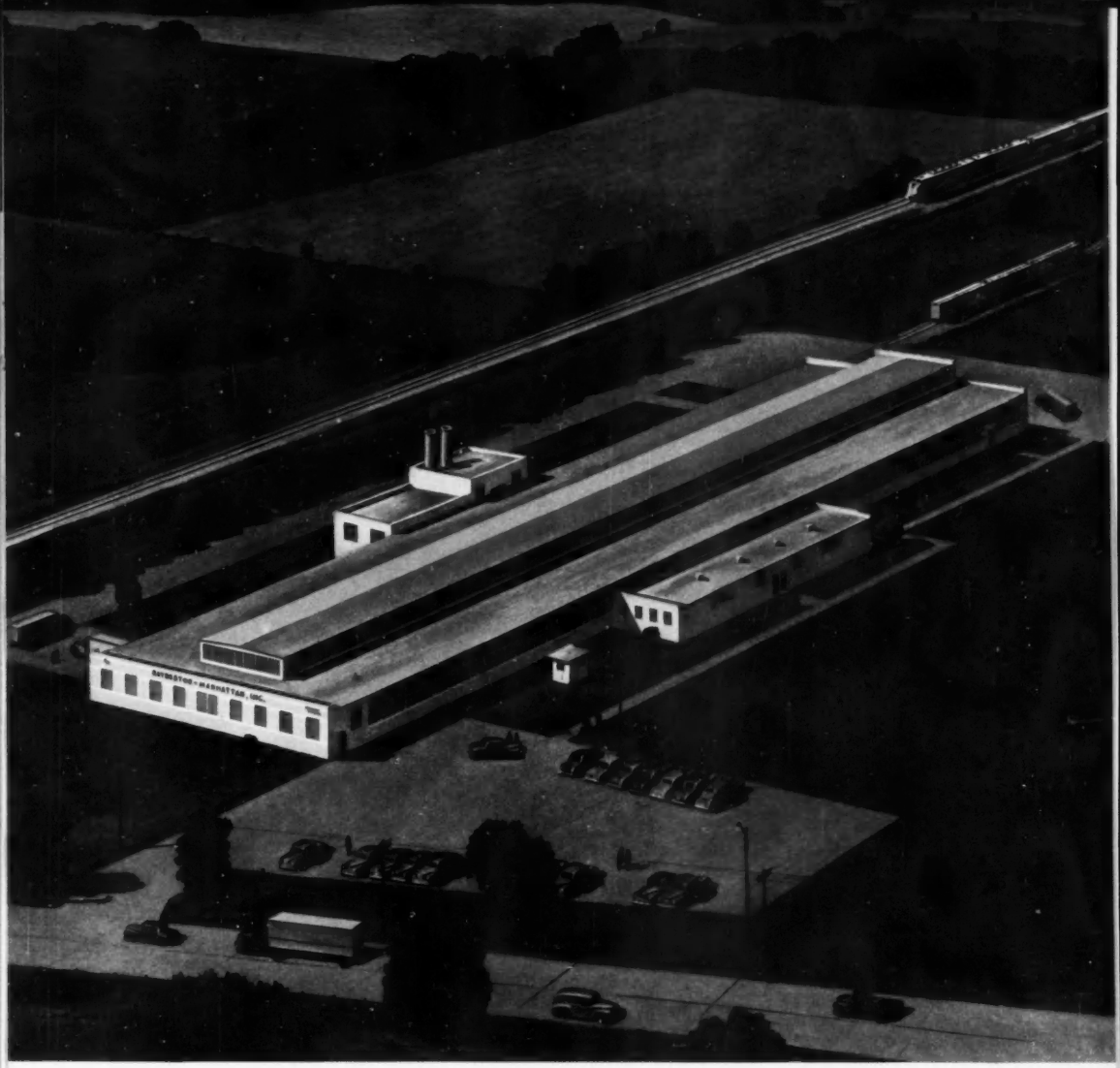
To strengthen the tapped threads indicated by arrows, Homelite uses Tap-Lok Inserts. They report that the Insert not only provides a dependable non-stripping fastening, but also acts as a lock on the screw, preventing it from vibrating loose during use.

The unique self-tapping feature of this hardened steel bushing also substantially reduces assembly costs by eliminating a separate tapping operation.

Write today for samples and descriptive folder.

GROOV-PIN CORPORATION

1119 Hendricks Causeway
Ridgefield, N. J.



RAYBESTOS-MANHATTAN, INC.

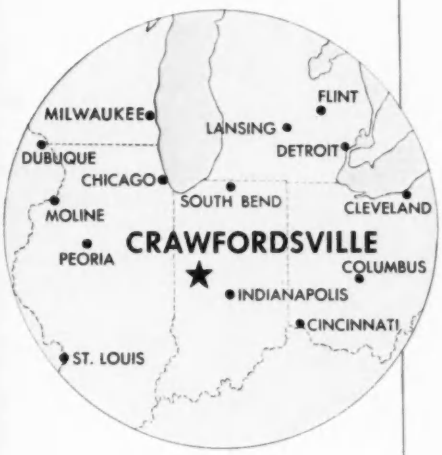
ANNOUNCES COMPLETION OF THE INITIAL UNIT OF ITS NEW MIDWESTERN PLANT—

WABASH DIVISION

CRAWFORDSVILLE, INDIANA

SINTERED METAL FRICTION ELEMENTS

for tanks and other military vehicles and for the aviation, agricultural and automotive industries and other precision parts of powdered metal will be manufactured at the Wabash Division.



THE NEW WABASH DIVISION

of Raybestos-Manhattan, Inc., is designed and equipped from the ground up with the finest facilities and most modern machinery for the manufacture of sintered metal friction elements.

INVALUABLE BACKGROUND

in setting up this new division was provided by thirteen years' experience in making similar sintered metal parts at our Raybestos Division, Bridgeport, Connecticut. Manufacture of these products will continue at the Bridgeport plant.

STRATEGIC LOCATION

of the new Wabash Division reduces delivery time to automotive-manufacturing and defense work centers of the Midwest: Detroit, Chicago, Milwaukee, South Bend, Cleveland, Peoria, Indianapolis, St. Louis, Cincinnati.

EXPANSION OF THIS DIVISION

was part of the planning when the sixty-two-acre tract was acquired. Additional buildings will provide manufacturing capacity for other Raybestos-Manhattan products at some future date.

OTHER DIVISIONS AND PRODUCTS OF RAYBESTOS-MANHATTAN, INC. ARE LISTED ON THE FOLLOWING PAGE

OTHER RAYBESTOS-MANHATTAN MANUFACTURING DIVISIONS AND PRODUCTS

FRICTION MATERIALS

Brake Lining, Molded and Woven, in Rolls and in Formed Segments

Brake Blocks, Molded and Woven

Clutch Facings and Automatic Transmission Friction Elements, Molded and Woven, Semi- and Full-Metallic

MECHANICAL RUBBER

Belts: Transmission, Multiple V, Single V, Conveyor and Elevator

Hose: General and Special Purpose, Automotive and Aviation

Rubber Specialties: Engineered Molded, Lathe Cut and Extruded Products

Rubber Covered Rolls, and Rubber Lined Equipment

ASBESTOS TEXTILES

Roving, Lap and Fillers, Yarns, Cloth, Tapes and Specialties

PACKINGS AND GASKETS

Asbestos, Rubber, Metallic, Flax, Plastic, Compressed Sheet

ABRASIVE AND DIAMOND WHEELS

Grinding, Finishing, Polishing and Cut-Off

BOWLING BALLS
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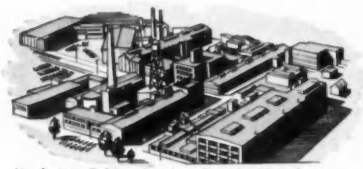
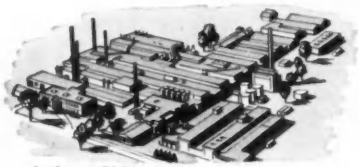
• ***Engineering assistance is freely offered for the application of all the Raybestos-Manhattan products and for the development of new products to meet special needs.***

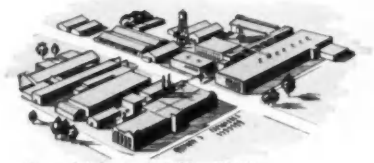


Manhattan Rubber Division, Passaic, New Jersey
(Branch Plant – Neenah, Wisc.)

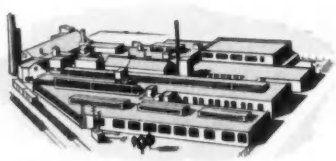


Raybestos Division
Bridgeport, Connecticut

U.S. Asbestos . . . Grey-Rock Division
Manheim, Pennsylvania



General Asbestos & Rubber Division
North Charleston, South Carolina



Canadian Raybestos Company Ltd.
Peterborough, Ontario

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RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION **620 Fisher Bldg., Detroit 2, Mich.**

Chicago 11 **Cleveland 14** **Los Angeles 11**

SPECIALISTS IN ASBESTOS, RUBBER, AND SINTERED METAL PRODUCTS

Printed in U.S.A.

MEN *in the* NEWS

(*Continued from page* 25)

ACF-Brill Motors Co.—**William Nelson** has been chosen vice president and assistant general manager; **J. D. Towne** has been selected as vice president and division manager of the Hall-Scott Div.; and **E. G. Mathauer** has been made chief engineer at the Philadelphia, Pa., plant.

Brewer-Titchener Corp. — **James H. Greene** has been elected president.

Caterpillar Tractor Co., Sales Training Div.—**Robert J. Loskill** has been named manager, and **Thomas A. Glass** succeeds him as assistant manager of the **Governmental Div.**

E. W. Bliss Co.—**Howard U. Herrick** has been appointed president.

Norton Co., Abrasive Div.—**C. John Sundberg** has been chosen assistant to the vice president in charge of sales.

Bristol Aeroplane Co. of Canada, Ltd., Engines Div.—**William D. Kennedy** has been named general manager.

Timken Roller Bearing Co., Automotive Sales Div.—**R. C. Wingerter** has been appointed assistant general manager, and **J. R. Splitstone** has been named district manager.

Pacific Airmotive Corp.—**Richard D. Maystead** has been appointed director of engineering.

Prest-O-Lite Battery Co., Inc.—**W. C. Roberts** has been appointed assistant sales manager.

Mack Manufacturing Corp.—**H. Bernard** has been named vice president in charge of service, and **T. J. Zeller** has been made vice president and chief engineer.

Dearborn Motors Corp.—**J. B. Davidson, Harry B. Walker,** and **J. B. Wilson** have been appointed engineering consultants.

White Motor Co.—**Herbert P. Ladds** has been elected to the board of directors.

Columbia Machinery and Engineering Corp.—**B. W. Wild** has been appointed assistant works manager of the firm's Hamilton, O., plant.

Autocar Co.—**V. H. Knowles** has been named district manager in Southern California.

Pittsburgh Screw and Bolt Corp.—**John J. Kelley** has been appointed dis-

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SENDS A TIRE TO THE FRONT

Tough mud-slogging tires roll our forces toward the front. Behind rugged-duty tires lie months of sound research with Magnecord tape recorders . . . vibration tests to determine the wear and performance of new tires in development. Precision testing demands the finest precision tape recording.

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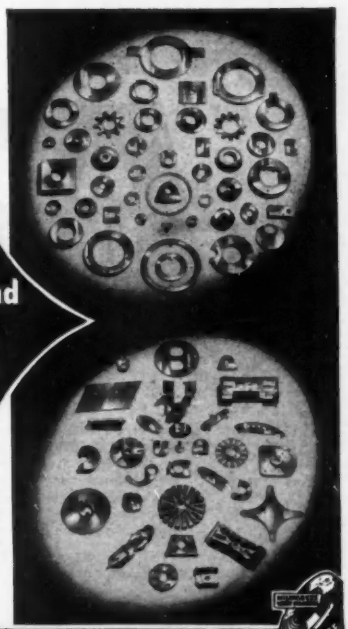

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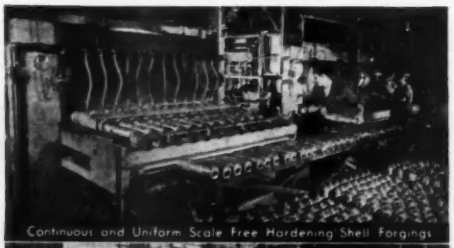
EF FURNACES *for* **shell forgings, shell cases, aircraft, tank parts, and other defense products**



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Norgren **MICRO-FOG LUBRICATORS**
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C. A. Norgren Co., Denver, Colorado, uses Ace Nylon Balls as feed tube checks in Micro-Fog Lubricators to provide instant oil flow.

ACE PRECISION
NYLON BALLS
FOR EXACT CONTROL

SIZES 1/4"—3/4"
TOLERANCES ±.001

Ace Nylon Balls of DuPont Nylon FM #10001 are mass produced to close tolerances giving you the advantages of toughness at low temperatures, form stability at high temperatures, light weight, chemical and abrasion resistance.

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ACE PLASTIC COMPANY
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trict manager for the new Detroit office.

Minnesota Mining & Manufacturing Co.—**Dr. J. O. Hendricks** has been promoted to the newly created post of associate director. **Dr. Matthew W. Miller** and **Dr. H. M. Scholberg** have been named assistant directors.

Crescent Co., Inc.—**Arnold Dahlstrom** has been assigned to head a special department set up to handle Government procurement activities.

Pittsburgh Plate Glass Co., Glass Div.—**Russell G. Whitemore** has been named acting director of the Product Development Dept.

Cummins Engine Co., Inc.—**R. F. Davis** has been promoted to regional manager of the Eastern Region.

B. F. Goodrich Co.—**Emerson G. Hammack** has been named manager of metal parts purchasing. **J. Terry Taylor** has been appointed manager of the track departments of the Akron Tire Div.

General Electric Co.—**Maurice E. Moulton** has been named manager of finance, and **Charles F. Steele** has been appointed counsel for the newly-created Defense Products Div.

American Steel & Wire Co.—**William R. Miller** has been appointed manager of the Metallurgical Dept.

Yale & Towne Manufacturing Co., Philadelphia Div.—**James H. W. Conklin** has been chosen general sales manager.

Spencer Rubber Products Co.—**Ward W. Killion** has been named manager of Molded Goods Operations.

Fairmount Tool & Forging, Inc.—**Arthur E. Keating** has been elected vice president and general manager.

General Electric Co., Specialty Transformer and Ballast Dept. — **H. K. Pritchard** has been named manager of general purpose transformer sales, **J. P. Coughlin** manager of aircraft and electronic transformer sales, and **A. E. Rowe** manager of lighting component sales.

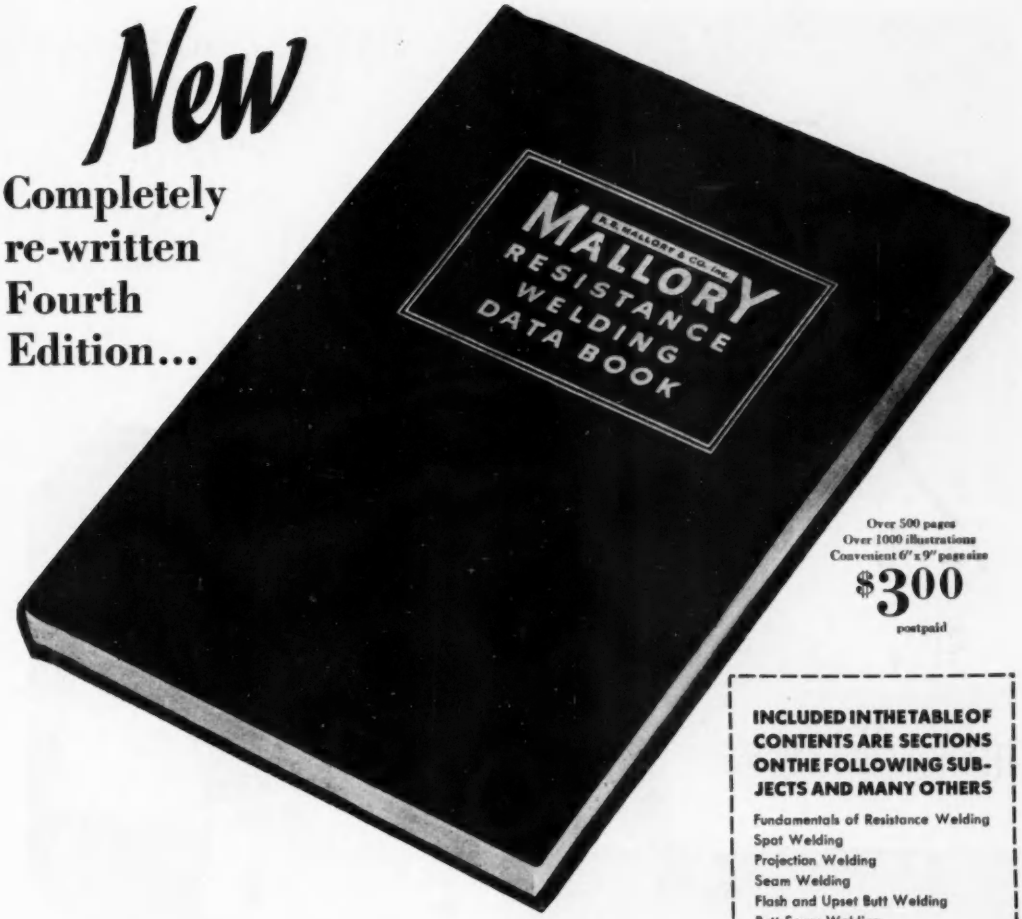
Miller Electric Manufacturing Co.—**C. Burnell Abel** has been appointed vice-president in charge of sales.

Cullman Wheel Co.—**E. W. Meyers** has been elected secretary.

Garrett Corp., A Research Manufacturing Co. Div.—**Charles B. Bunch** has been promoted to manager of the Dayton, O., office, succeeding **Harry H. Wetzel**, appointed sales and service representative at the new Phoenix, Ariz., plant. **Robert D. Shoenhair** has been named head of the gas turbine and starter sales group.

New

Completely re-written Fourth Edition...



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- Electro-Forging & Upsetting
- Electro-Brazing
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- Alloys to be Welded
- Resistance Welding Electrodes Dies & Holders
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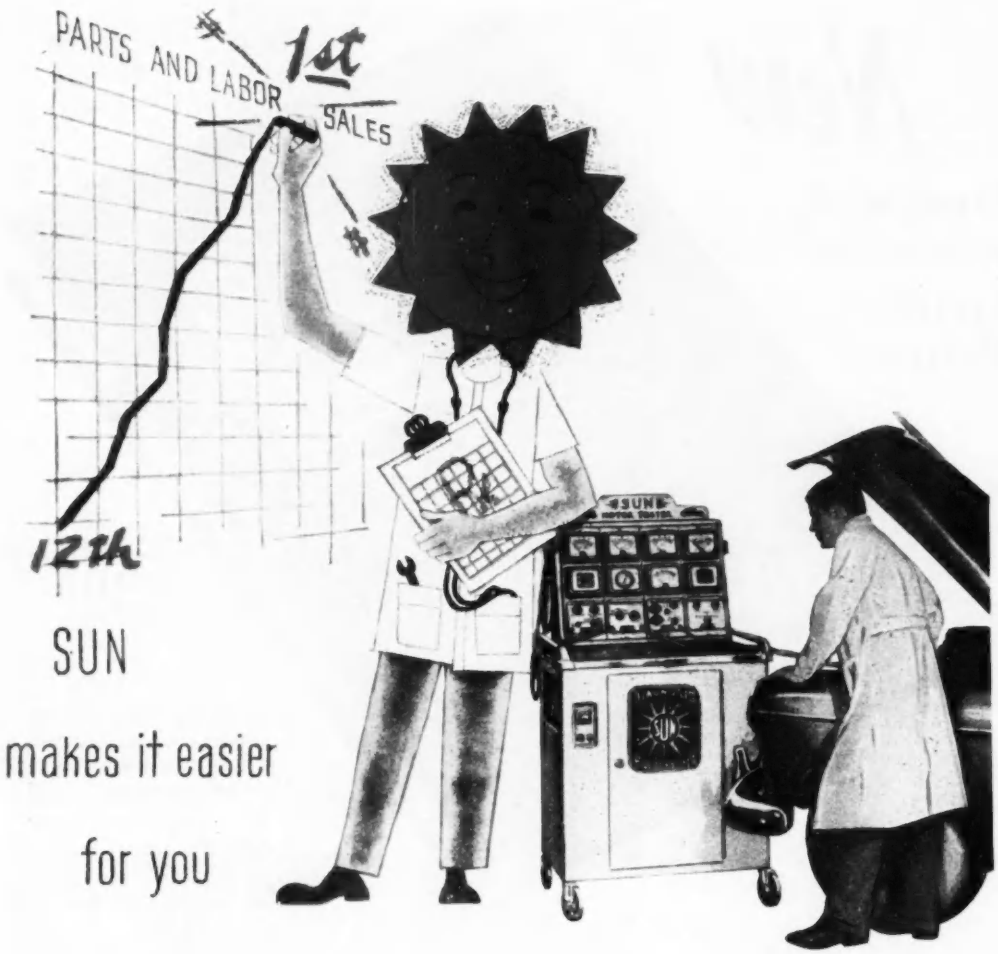

. . . to increase parts and labor sales

From twelfth place to first place in sales and service among sixty-one dealers in his region! That's the report of a car dealer who recently installed a SUN Scientific Diagnosis Department. This dealer showed 58% increase in parts and labor sales. Similar reports are received daily from car dealers and independent repair shop owners all over the nation.

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Precision Shaved Gears to Drive the.....

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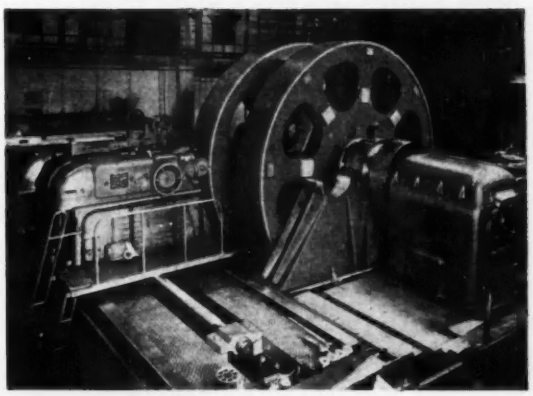

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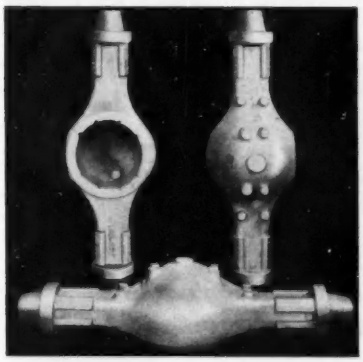

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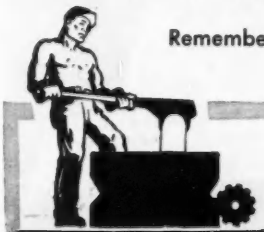
Companies using truck and trailer parts made from FRONTIER 40-E Aluminum Alloy castings are saving **1750 pounds** on the average tractor, **950 pounds** on converter parts and **2300 pounds** on trailer parts. Total weight reductions add up to over **7000 pounds extra payload!** This means increased revenue earned in Freight Ton Mile hauling for those companies taking advantage of the light-weight high-strength qualities of FRONTIER 40-E. You, too, will find 40-E's superior machineability, its shock and corrosion resistance, and its weight-saving features extremely valuable in castings used on your rolling equipment. Get the facts TODAY.

Write Today for your copy of the FREE DATA BOOK and full 40-E details.



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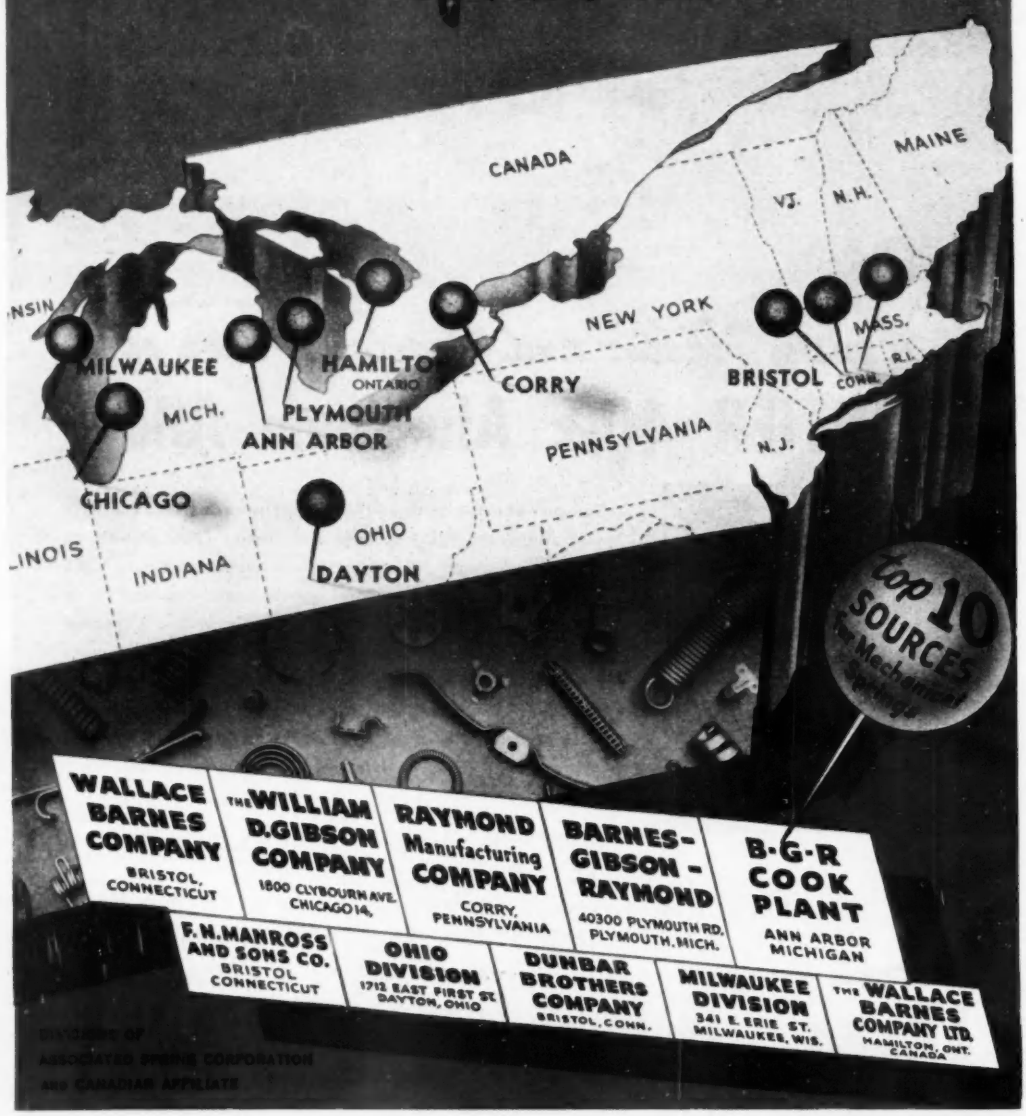

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Users are finding Antisep handles better than 90% of their metal cutting jobs. You'll stock *one* instead of many cutting oils for general machining work—automatics.

You'll dilute this efficient all-purpose base as much as 30 to 1 with plain water. You'll save space and simplify selection. You'll reduce machining costs substantially and yet handle the toughest operations. Try a drum or two and prove it.

If you want further information—or would have us arrange a convincing test in your plant—write to E. F. Houghton & Co., Philadelphia 33, Pa. We'll also send you the booklets mentioned at left.

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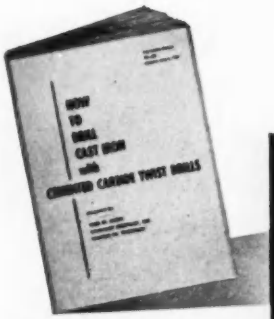
How to get production UP



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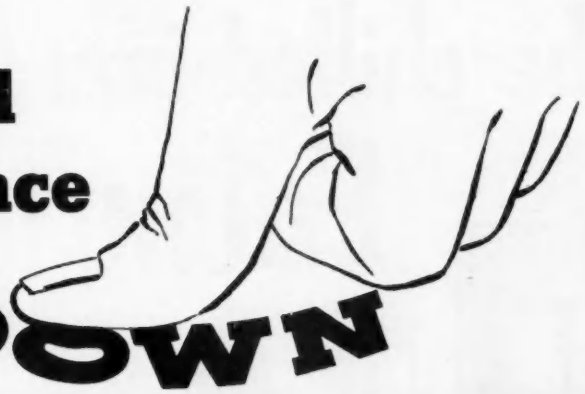

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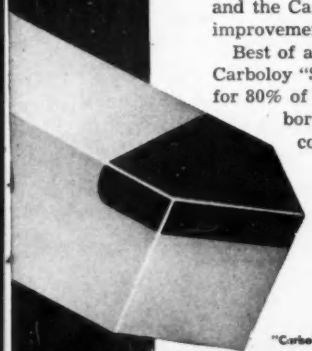
Best of all, just 11 styles of these Carboloy "Standards" are adaptable for 80% of your turning, facing and boring operations . . . they conserve tools and cut costs because they replace the need for hundreds of inventory-loading "specials."



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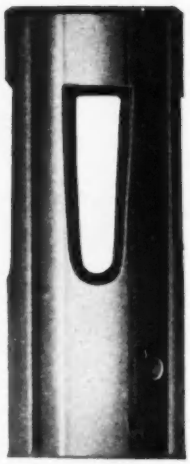
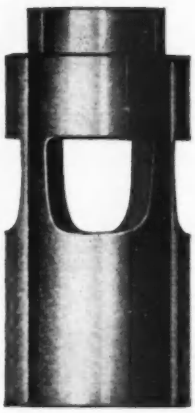
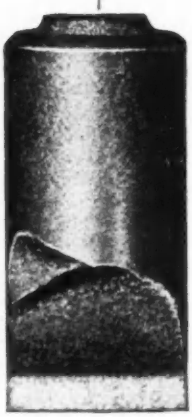
the chilled-iron face gives Eaton Tappets superior load-carrying capacity and longer life







To keep pace with the requirements of today's higher-speed, higher-compression engines, Eaton has developed special foundry facilities to produce chilled-face tappets with essential hardness and wear-resistant characteristics. Eaton offers volume-produced, volume-priced, lightweight tappets capable of carrying excessively high loads. From the ladle to final inspection, the wear-resistant hardness of the face and the over-all quality of Eaton tappets are guarded by precise metallurgical control.

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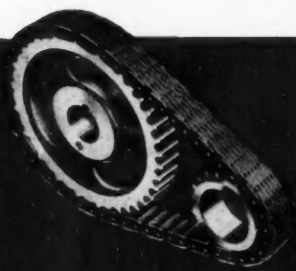

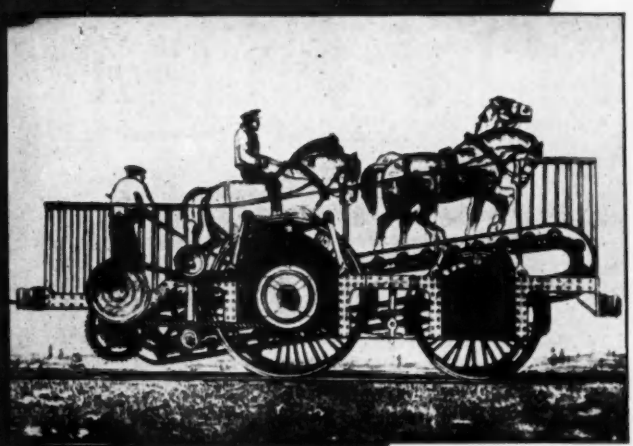

The idea behind this sketch of a horse-powered locomotive, whatever its shortcomings, was at least another step toward today's highly developed means of transportation. As more efficient means of propulsion were introduced, Morse Chains were there, matching development for development, to add their efficiency and smoother operation in the transmission of power.

This is one of a series of old prints of old machines (and ways of power transmission) that will appear in future Morse advertisements. Write for your free, enlarged copy, suitable for framing for your collection.

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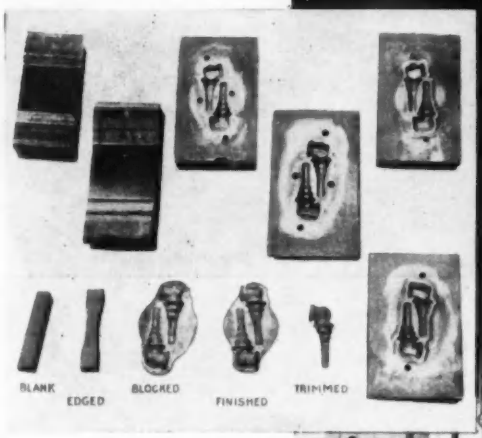
A HEAVY PRESS *makes Light Work of Impression Die Forging*

Ajax Solid Frame Forging Presses are engineered and built to produce impression die forgings of highest quality at new high rates of production and at a minimum cost. The great rigidity of the solid steel frame, the instantaneous response to the treadle achieved by the patented air clutch, the accuracy of slide alignment and the minimized period of contact of the hot metal with the dies all contribute to making impression die forging easier and less costly than on slower, less rigid and less accurate presses . . . for impression die forging use an AJAX Forging Press.



Dies and Forging operations for forging tractor steering knuckles in pairs.

•

AJAX HIGH SPEED PRESS *forging tractor gear blank at International Harvester Company, Louisville, Kentucky, Works.*

WRITE FOR BULLETIN 75-B

THE Ajax MANUFACTURING COMPANY
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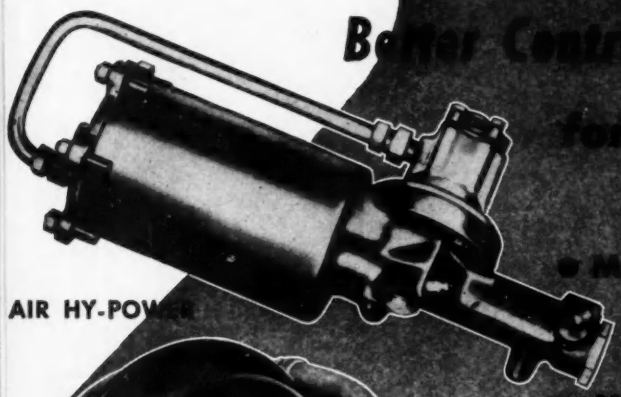
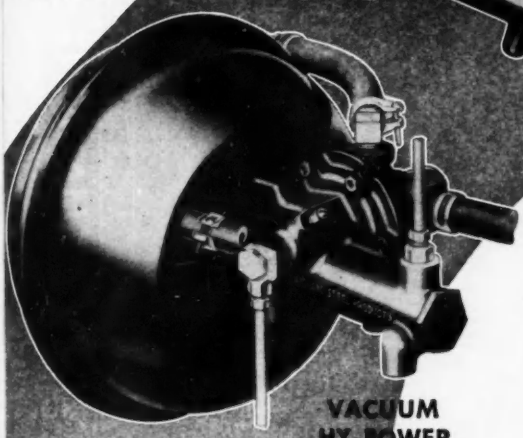
Air and Vacuum POWER BRAKES

Better Control—Greater Safety . . .

for TRUCK—TRACTOR—TRAILER OR BUS



AIR HY-POWER



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• MIDLAND AIR HY-POWER

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Fewest parts—less weight—direct applied power—sealed against water, mud, dirt or dust.

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• MIDLAND REPAIR KITS

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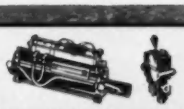
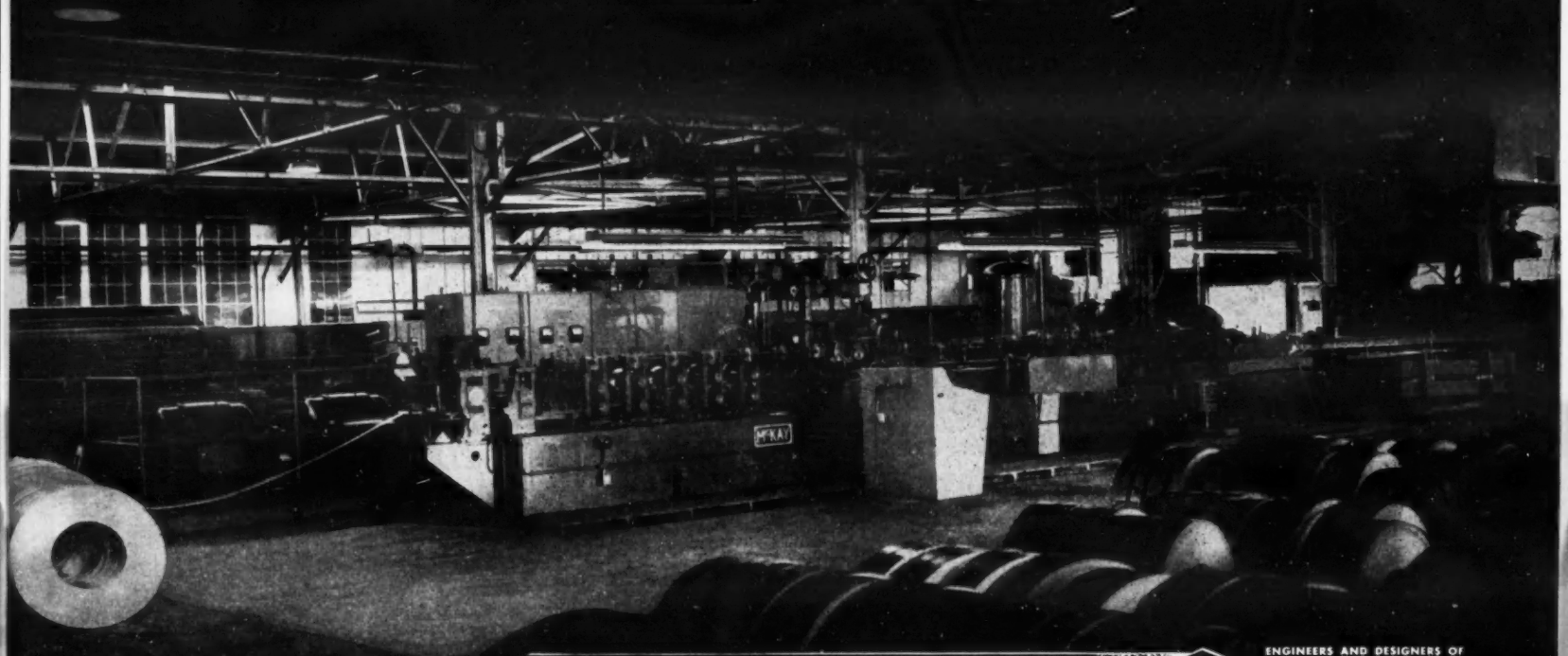


McKAY

WALKER BROTHERS, of CONSHOHOCKEN, PA., have earned their reputation as manufacturers of quality conduit and electrical raceway tubing through years of serving the electrical industry. To maintain this position, it requires constant and rigid inspection—an alertness to new methods and the use of quality equipment.

McKAY is proud to have had their tube mills selected by WALKER. Experience gained after producing millions of feet of conduit on McKay tube mills, has proven conclusively that they can rely on McKay equipment to maintain their high standard of quality and keep pace with the ever increasing volume demanded by industry.

If your product is tubing it will pay you to investigate McKay equipment for greater yield—higher quality product — lower maintenance — and less down time.



The McKay RS-525-150 KVA Electric Weld Tube Mill with McKay Rotary Saw Cutoff

ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, FABRICATING AND STEEL INDUSTRIES

McK

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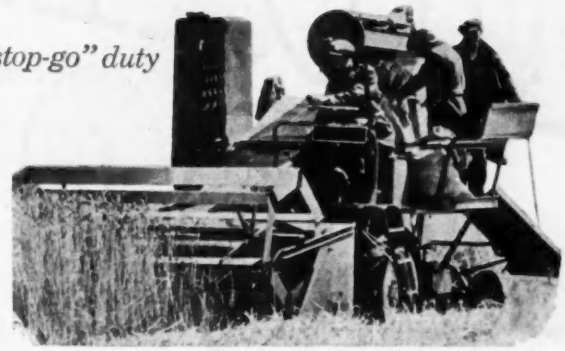
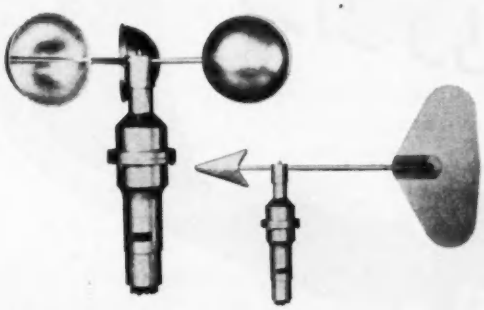
Improves efficiency in rugged "stop-go" duty

As demonstrated in the bonding of the linings to the brake drums of this modern reaper, Ardux Resins fill a unique niche in product engineering wherever durable bonding of metals, (ferrous and non-ferrous), and plastics to natural or synthetic rubbers is required under extreme conditions of vibration, torque, friction, etc.

Editor's Note:—High strength at high temperatures, reduction of stress failure and shock loading achieved through use of Ardux Resins improves manufacturing methods and adds new selling features to products of the automotive, aviation and allied industries. Send for Ardux Technical Bulletin.





Courtesy of W. & L. E. Gurley, Troy, N. Y.

Braced for the breeze!

Araldite Resins simply and durably bond the cups to cup arms of the precision-built Wind Velocity Transmitter, and bond the tail fin on the vane of the Wind Direction Transmitter. In both instances Araldite Resins proved superior both in manufacturing and functional efficiency in withstanding both high wind velocities and exposed conditions than the brazing methods previously used.

Editor's Note:—Araldite Bonding Resins by their wide range of use, and overall economy, have improved many established operations and opened important new fields of product development. Send for Araldite Technical Bulletin.

Idea Generators! Newest ARALDITE and ARDUX Resins Technical Bulletins are now ready, giving complete details on physical properties and recommended procedures. Profusely illustrated with application photographs.

*Reg. U.S. Pat. Off.

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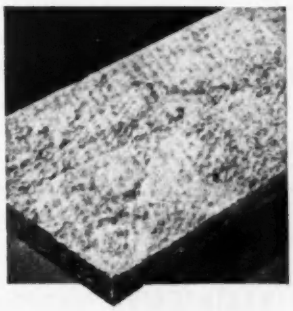

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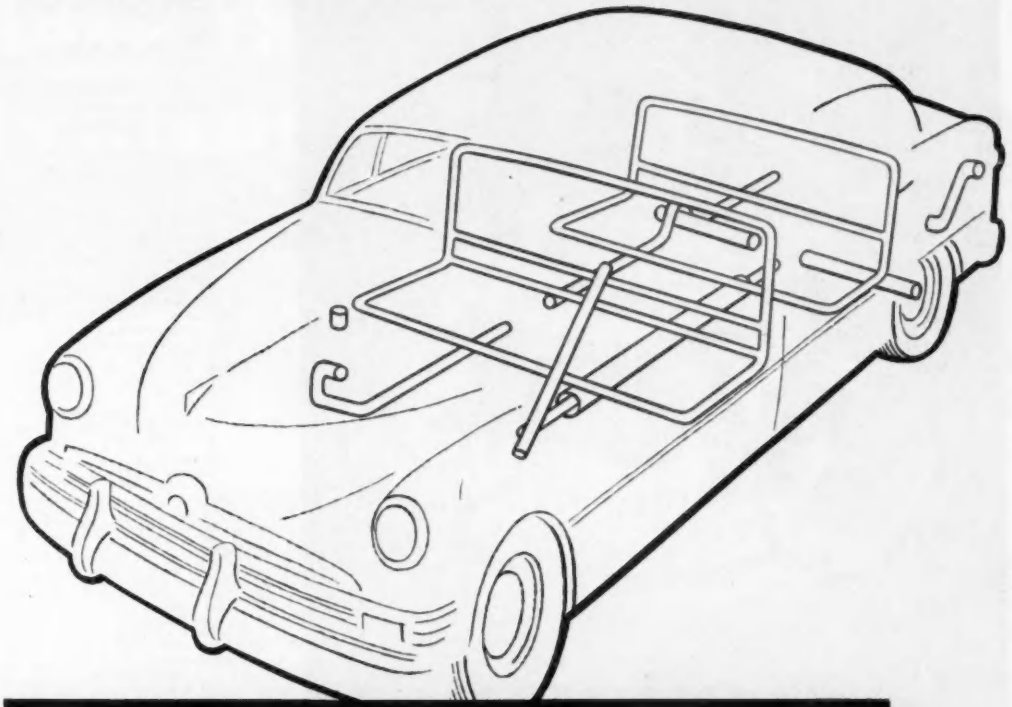
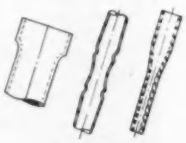
another job for Brainard ELECTRIC-WELDED TUBING



MASS PRODUCTION PARTS FOR THE HIGHWAY



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Brainard's integrated production facilities assure quality control throughout manufacture . . . from ore to finished tubing. You can depend on Brainard service for *your* needs. District offices in principal cities throughout the U. S.

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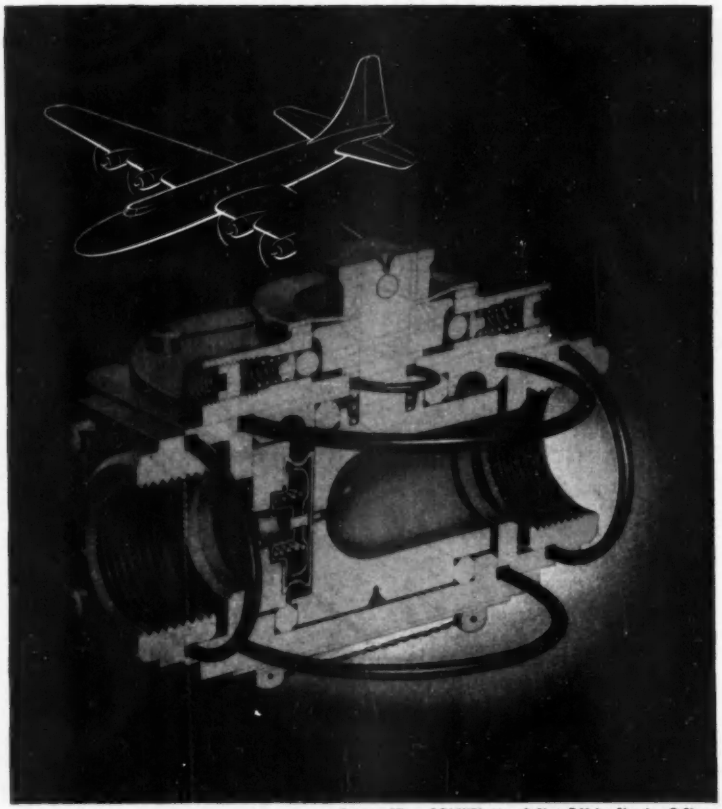

Cutaway View of PARKER Aircraft Shutoff Valve Showing O-Rings.

Leakproof Seals...Simple to use

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THIS IS IT

Cross section drawing of O-ring in groove, sealing under pressure.

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Forging is older than civilization

One of the outstanding characteristics of forged metal parts, as contrasted with metal parts formed by other methods—casting, pressing, welding, etc.—is the movement of the fibres of the metal in following the contours of the part. This is known as "grain flow" and results in placing strength where it is required. The photograph to the right is → part of a section of an automobile crankshaft forging etched to show the grain flow, particularly at the "cheeks", which are the load-bearing surfaces.

ARCHEOLOGISTS agree that while true man has been on the earth for from 40,000 to 50,000 years, the age of culture can be dated not earlier than Neolithic man or some 12,000 years ago. And perhaps no longer ago than 6,000 B. C. did civilization which is a combination of the fundamental techniques of domestication of animals, agriculture, horticulture, pottery, brick-making, spinning, weaving and metallurgy, come into existence. Yet the hammer, the first of man's implements (the knife was the second) goes back beyond the age of true man to Neanderthal man who roamed the earth 100,000 years ago.

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Chambersburg hammers have been meeting the constantly more rigorous demands of industry for stronger forgings, tougher forgings, more accurate forgings, in greater quantities, in shorter time . . . for over half-a-century.

CHAMBERSBURG ENGINEERING CO., Chambersburg, Pa.

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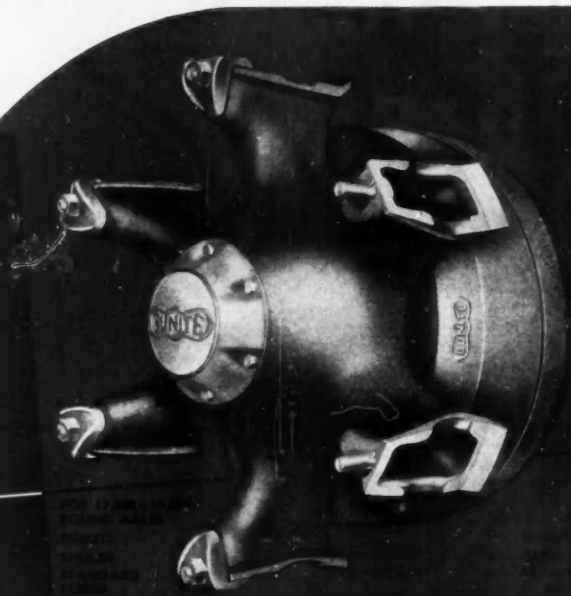
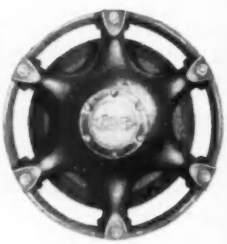
THE HAMMER BUILDERS

SAVE 100 POUNDS PER TANDEM AXLE!

...WITH GUNITE'S NEW 22" TRAILER WHEEL



A COMPANION WHEEL TO THE FAMOUS GUNITE 20" THIS NEW 22" GUNITE TUBULAR SPOKE WHEEL IS . . .



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Depth Bomb part drawn with Advance Dies from 31½" steel blank.

THIS DIFFICULT STAMPING SIMPLIFIED BY NEW ADVANCE TOOLING METHOD

Here's another example of ADVANCE tooling ingenuity. The problem: This depth bomb tail piece deep-drawn to the dimensions shown above . . . in just two draws . . . from a 14-gauge steel blank. Similar pieces were formerly produced with five or six draws, or by butt-welding two halves.

Advance tooling techniques met the requirements — with dies that produced the part in two draws as specified. Advance can help you with your difficult drawing and stamping problems . . . and save you time and money in your processing operations. Our engineers and our completely equipped die plant are ready to serve you. Consult us — or write for complete information.

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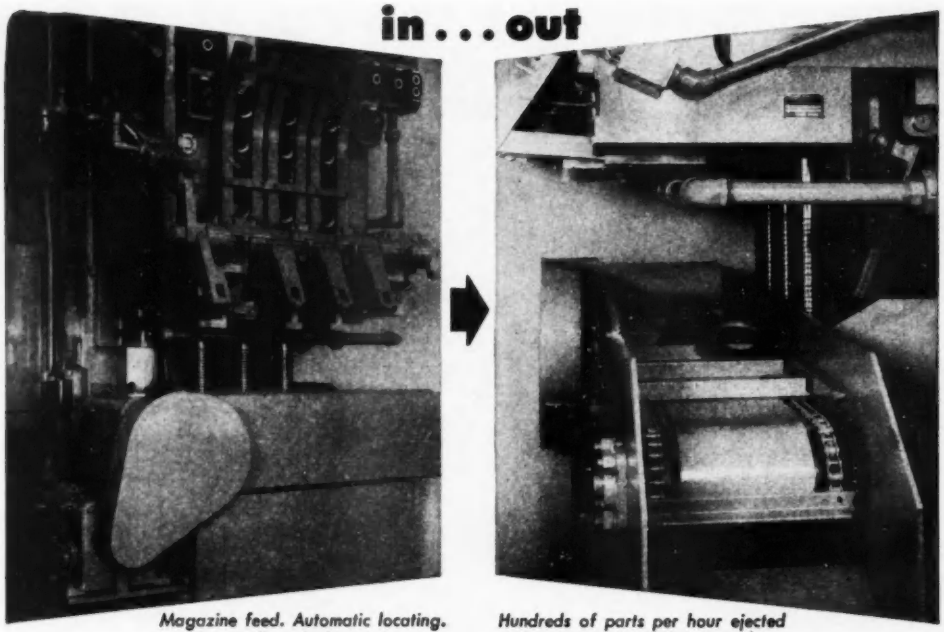

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'Engineered by Colonial'.

PIONEERS OF H.S.S. BROACHING
COLONIAL
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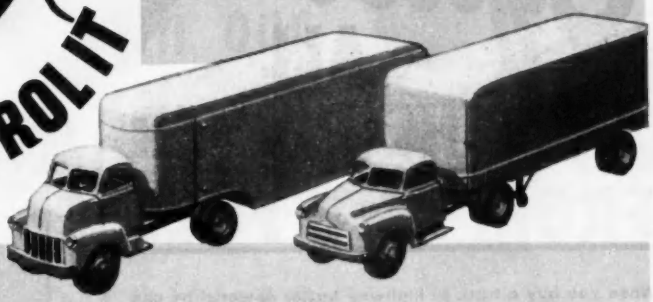
the greatest name in BRAKES



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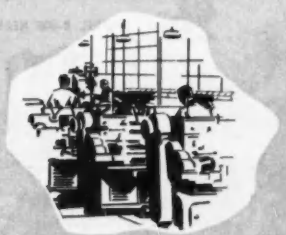

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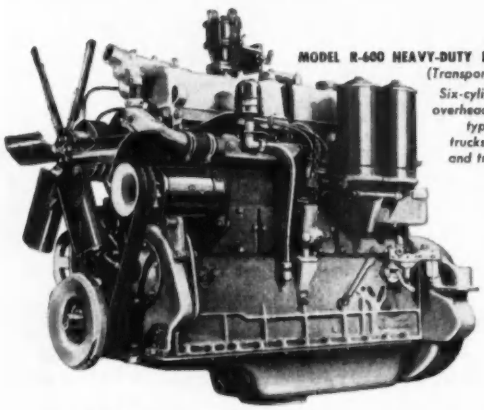

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Six-cylinder—overhead valve type—for trucks, buses and tractors.

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PROMPT DELIVERY

FEDERAL-MOGUL

FEDERAL Mogul Since 1899

Our six plants produce sleeve bearings in all designs and sizes; cast bronze bushings; rolled split-type bushings; bi-metallic rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.

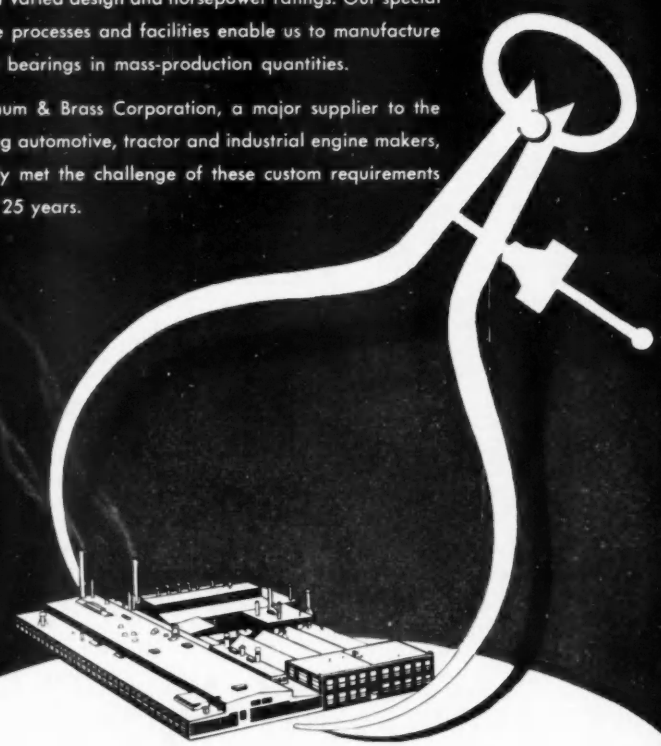
FEDERAL-MOGUL CORPORATION • 11037 SHOEMAKER • DETROIT 13, MICHIGAN

Made to measure

for America's great engine builders

PROBLEMS of bearing-load and bearing-life differ with engines of varied design and horsepower ratings. Our special skills, exclusive processes and facilities enable us to manufacture custom-quality bearings in mass-production quantities.

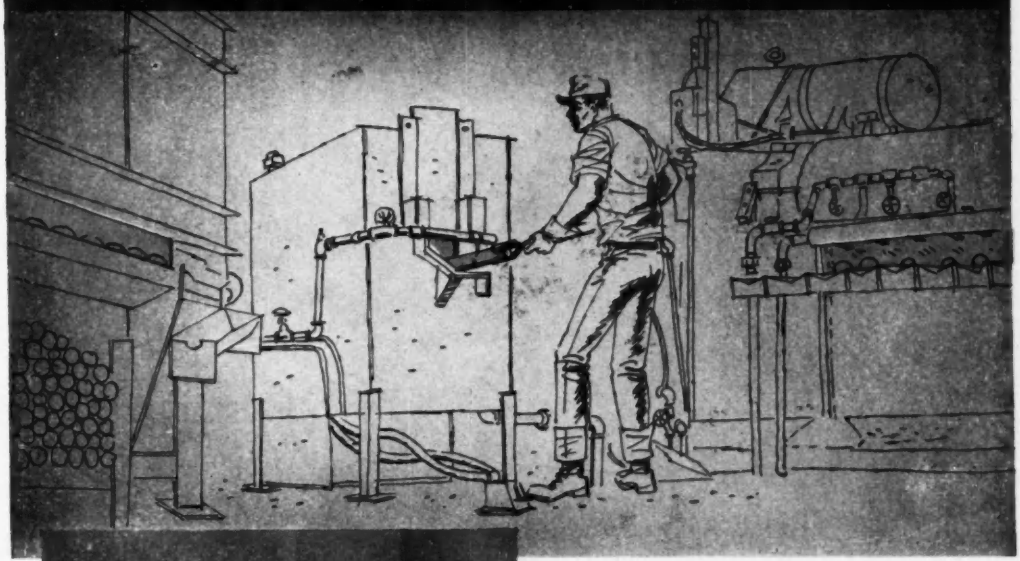
Detroit Aluminum & Brass Corporation, a major supplier to the nation's leading automotive, tractor and industrial engine makers, has consistently met the challenge of these custom requirements for more than 25 years.

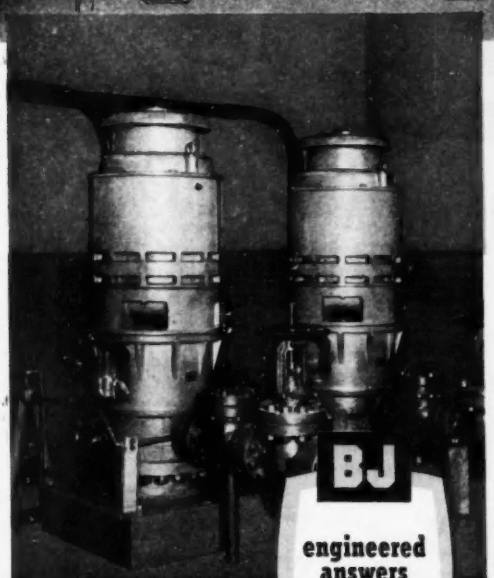


DETROIT ALUMINUM & BRASS CORPORATION

DETROIT 11, MICHIGAN

KNOCKS OFF SCALE IN 1½ SECONDS!





This automobile plant uses two BJ Hydropress Pumps for descaling. One pump services as many as 10 cabinets (with 5 operating at once).

Auto industry uses BJ Hydropress Pumps to descale forged parts hydraulically!

Manual or mechanical descaling operations are time-taking and profit-robbing. Especially when a product requires several descalings during production. You'll save time, money and rejects by descaling hydraulically with BJ Hydropress pumps.

Here's one of the many examples of modern hydraulic descaling as used by the automotive industry. During the heating of axle bars prior to forming, scale is created and must be removed. This is done in a hydraulic descaling cabinet. As the bar is inserted, a lever is tripped and high velocity water at 1500 to 2000 psi hits the bar from 3 to 5 nozzles. Scale is removed in 1½ seconds! Afterwards the hot bar is placed on a forming roll.

The BJ Hydropress pump is ideal for this type of work because of its unique construction features. It does not require relief valves, accumulators or extra heavy fittings and piping. Its double volute design creates inherent balance at all heads and capacities. Its vertical construction allows the use of a simple foundation and a minimum of floor space.

For more information call your local BJ sales engineering office or write:

Byron Jackson Co.

Since 1872

P. O. Box 2017, Terminal Annex, Los Angeles 54, California

Sales Offices in Principal Cities

"Wonder how many there'll be in 1960?"

You guess! 50 Million? 60 Million? Whatever the number, they will surely be *better* cars . . . safer, more comfortable, and more efficient.

And what will make them better? Among other important factors, improved *castings*. Even now, cast camshafts, cylinder blocks and heads, pistons and other automotive castings are being designed for the engines of the future. These castings will be of advanced design, with greater strength and wear resistance and better machinability. These castings are being developed *now* by the largest independent contracting foundry in the world . . . Campbell, Wyant and Cannon . . . *where advanced metallurgical engineering, precision control, and mechanized production assure the highest quality castings at lowest cost.*

CAMPBELL, WYANT AND CANNON FOUNDRY COMPANY, MUSKEGON, MICHIGAN

Foundries in Muskegon, South Haven and Lansing, Michigan

. . . serving the automotive, farm equipment, railroad and marine industries and the Armed Forces.

CWC

Since 1908

CAST CYLINDER HEADS AND BLOCKS · CAST PISTONS · CAST CAMSHAFTS · CAST CRANKSHAFTS · CAST GEARS · CENTRIFUGALLY CAST CYLINDER LINERS · CENTRIFUSE BRAKE DRUMS

Cummins® Diesels do so many jobs... so much better

...because they're custom-built to fit the job!

On-highway trucks, buses

Industrial locomotives, cranes, shovels

Logging yarders and loaders, crawler tractors

Drilling rigs, centrifugal pumps, generator sets

Earthmovers, off-highway trucks

Work boats, pleasure craft

Lightweight, high-speed Diesels (50-550 hp) for these and many other uses

...because they're

BUILT NOT ONCE BUT TWICE

Need rugged power? Then you need lightweight, high-speed Cummins Diesels, custom-built to fit your needs. Each engine is built *twice*. It's assembled, run-in tested, disassembled and inspected, then reassembled and tested again. Consider Cummins' craftsmanship; the exclusive Cummins fuel system; our efficient and expanding parts and service organization. These all add up to minimum "down-time", more power and profit for the user. See your Cummins Dealer.

Diesel power by CUMMINS

CUMMINS Diesels DIESEL

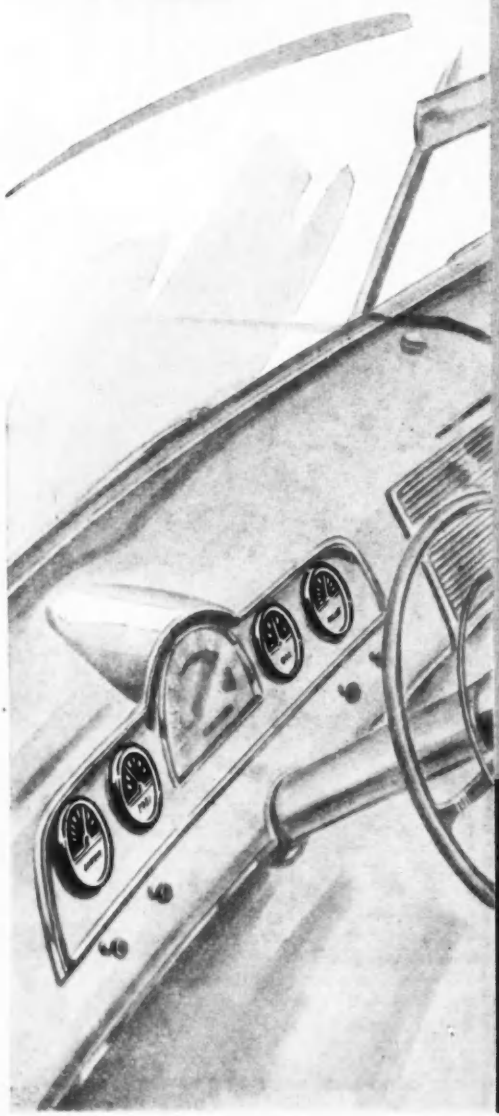
TRADEMARK REG. U. S. PAT. OFF.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: Cummins Diesel Export Corporation • Columbus, Indiana, U. S. A. • Cable: Cumdiex

KS DASHBOARD INSTRUMENTS

Manufactured Under Rigid Quality Control



Oil Pressure Telegage

Water Temperature Telegage

Fuel Level Telegage

Ammeter

Scientific Quality Control governs all manufacturing and assembly operations involved in the production of K S dashboard instruments and instrument clusters for passenger cars and trucks.

As a result these instruments are dimensionally accurate, easy to install; they function uniformly and assure the ultimate user years of uninterrupted service.

King-Seeley engineers are always at your service.

KING-SEELEY CORPORATION

ANN ARBOR, MICHIGAN

PLANTS IN

ANN ARBOR SCIO

YPSILANTI

Help a jet go further..faster ..with the new Thompson AIR-TURBINE PUMP

Typical afterburner pump model weighs only 9.0 lbs., but delivers 35 H.P.

Air-turbine operates at speeds up to 30,000 R.P.M. with 500° F. air. The pump will operate over −65° F. to +250° F. temperature range. Can be used with all military fuels.

Again, Thompson leadership brings you a Thompson "First" . . . the first fully-proved, service-tested air-turbine pump.

New, and proved in the air, the Thompson air-turbine pump uses air from the jet compressor to pump fuel to the afterburners for additional jet thrust. It can produce a pumping effort equivalent to 35 H.P., yet weighs only 9.0 lbs.

Designers like the flexibility of placement and installation that the Thompson air-turbine pump provides.

May we tell you more about this newest Thompson development and other developments of air-turbine accessories?

ACCESSORIES DIVISION

Thompson Products, Inc.

EUCLID, OHIO

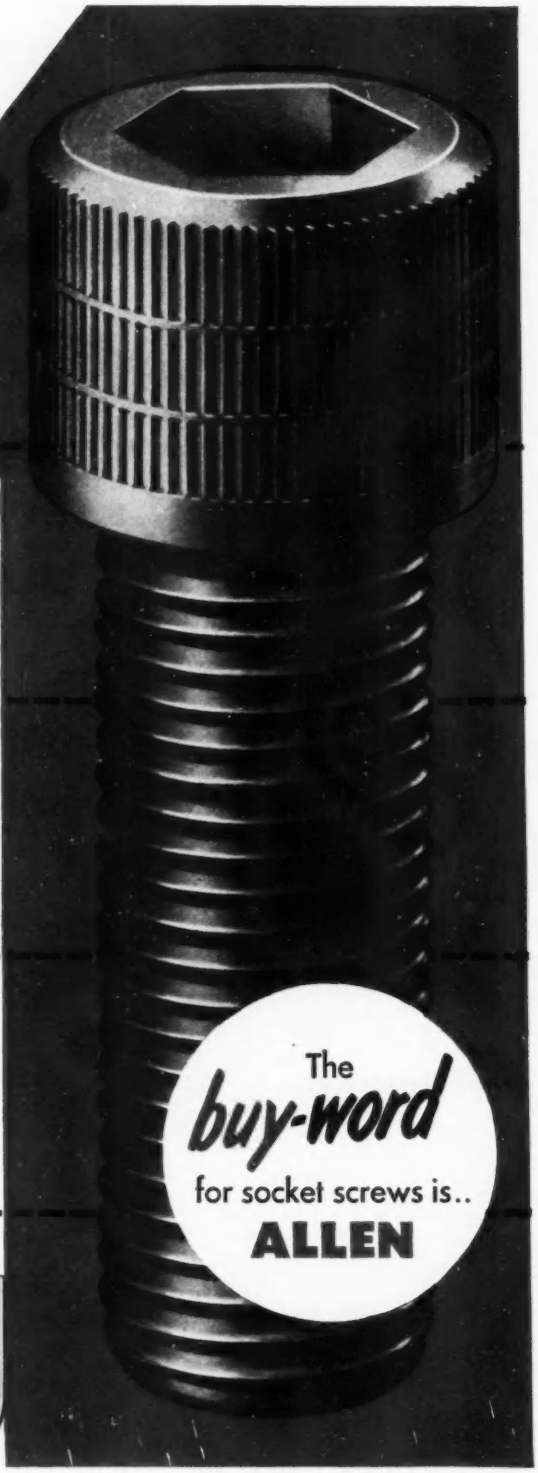
YOU CAN COUNT ON THOMPSON FOR ENGINEERING LEADERSHIP

The

Number One

name in socket screws..

ALLEN



with design engineers...

No. 1 because Allen's greater strength, greater holding power and freedom from projecting heads permit more compact design and smooth, safe surfaces.

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No. 1 because Allen O Heads' superior uniformity is maintained by statistical chart control. Burr-free threading and keying speed assembly time.

with the end user...

No. 1 because Allen O Screw products identify equipment that is designed right, built right. Allen screws, with more durable threads and sockets make adjustments, disassembly and reassembly easy and trouble-free.

. . . Sold only through leading distributors.

ALLEN ALLEN HEAD

MANUFACTURING COMPANY
Hartford 2, Connecticut, U. S. A.

The *buy-word* for socket screws is..
ALLEN

NOW! Industry's most famous electric drill is finer than ever!

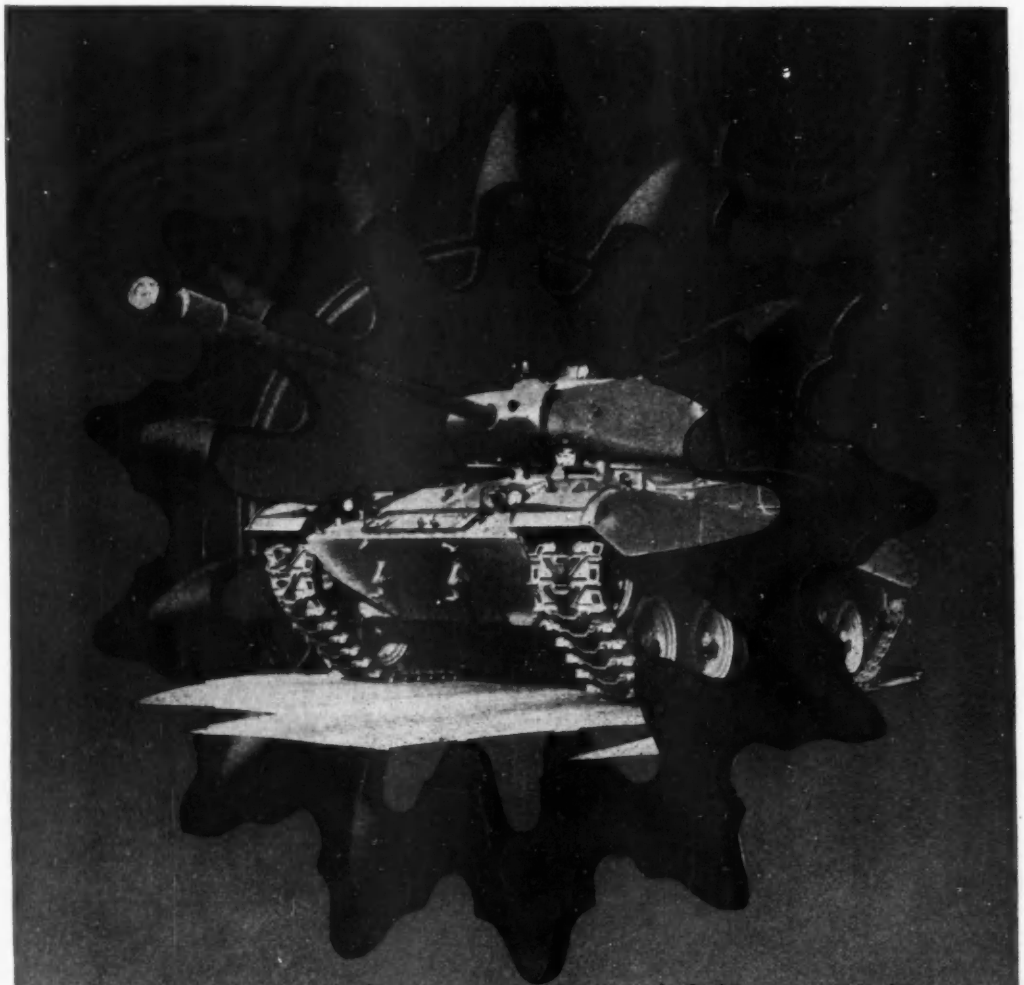
NEW Black & Decker 1/4" Heavy-Duty HOLGUN* only $44.00

TRY THIS HUSKY HANDFUL OF POWER YOURSELF . . . TODAY!

Let your nearby Black & Decker Distributor demonstrate this latest version of the most famous Drill in the electric tool industry! See for yourself how it will save you money, muscle and man-hours! See for yourself why experienced tool buyers hail it as a real champion! Or, write for full details to: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Md.

BD Black & Decker TOOLS

WORLD'S LARGEST, MOST COMPLETE LINE



SPROCKETS *Forged by* KROPP

HELP THE TANK PROGRAM ADVANCE!

Formerly these 27-inch diameter tank drive sprockets were cut from square steel plate. Waste metal from each cutting was approximately 137 pounds per sprocket. And—beside the usual cleaning and hardening, the cut sprocket had to be machined.

Now this part is drop forged by Kropp . . . forged so accurately that *no machining is necessary.* It is just heat-treated, cleaned, the teeth flame-hardened. When bolt holes are drilled, it is ready for installation on the tank.

DEFENSE PLANTS! Sub-contract your drop or upset forging work . . . and your heat-treating . . . with Kropp. Tell us your needs *today* . . . we can supply them promptly.

KROPP FORGE COMPANY
Chicago 50, Illinois

SUBSIDIARIES: A. C. WOODS & CO., Rockford, Ill. • KROPP FORGE ORDNANCE CO., Melvindale, Mich.

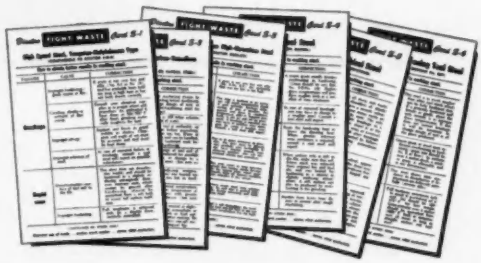
IS OLD TOOL STEELS HARD TO GET?

STRETCH WHAT YOU HAVE WITH

DISSTON "FIGHT WASTE" PROGRAM

In spite of the best efforts of the steel industry . . . in spite of above-capacity steel production — tool steels remain in short supply and are getting more so every day!

The Disston "Fight Waste" Program can help you stretch the supply of tool steels you now have . . . can help you do more with the steels you are now using. Basis of the "Fight Waste" Program is the use of individual instruction cards on six basic types of tool steels. These cards contain information on the selection, working, and application of tool steels to help you get better tool performance and longer tool life—to help cut waste of vital steels.



DISSTON SUPPLIES THESE CARDS FREE — WITHOUT COST OR OBLIGATION — IN QUANTITIES DESIRED. ORDER BY NUMBER

No. S-1 HIGH SPEED STEEL, TUNGSTEN-MOLYBDENUM TYPE
(Comparable to DISSTON 6-N-6)

No. S-2 WATER-HARDENING CARBON OR CARBON-VANADIUM TOOL STEEL
(Comparable to DISSTON Best Tool or Vatool Steel)

No. S-3 AIR-HARDENING HIGH-CARBON HIGH-CHROMIUM STEEL
(Comparable to DISSTON Croloy)

No. S-4 OIL-HARDENING TOOL STEEL
(Comparable to DISSTON Mansil)

No. S-5 CHROME-TUNGSTEN CHISEL STEEL
(Comparable to DISSTON Keystone)

No. S-6 NICKEL-CHROME, OIL-HARDENING TOOL STEEL
(Comparable to DISSTON Nicroman No. 827)

Disston also has "Fight Waste" instruction cards covering a wide variety of wood and metal cutting *tools*. These cards provide specific information on the most efficient use and care of tools to reduce breakage, stop waste of material, and increase production. We'll be glad to send you complete information. Use the coupon below.

NEEDED:

HALF A TON OF SCRAP FOR EVERY TON OF STEEL

An opportunity for every plant to help "Fight Waste": Record-breaking steel production and continued large-scale expansion of productive capacity have forced the scrap inventories of American steel mills to dangerously low levels. It is absolutely vital to the continued production of steel—*to your supply of steel*—to increase the flow of scrap to steel mills.

FREE FOLDER—sent on request! A special Disston folder on steel scrap: tells what types of scrap are needed . . . how to organize your plant for scrap salvage . . . where to sell your scrap. Disston will supply you with as many of these folders as you need...FREE!

SCRAP TURNED IN . . .
IS STEEL TURNED OUT!

HENRY DISSTON & SONS, INC.
131 Tacony, Philadelphia 35, Pa., U.S.A.

CLIP AND MAIL TODAY

HENRY DISSTON & SONS, INC.
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Please send me the following: (Check)

FIGHT WASTE Cards

No. S-1 ..... No. S-3 ..... No. S-5 .....
No. S-2 ..... No. S-4 ..... No. S-6 .....

.. Information on Wood- and Metal-Cutting Tool Cards
.. Copies of Steel Scrap Folder

NAME .....
ADDRESS .....
CITY ..... ZONE .... STATE .....
COMPANY ..... POSITION .....

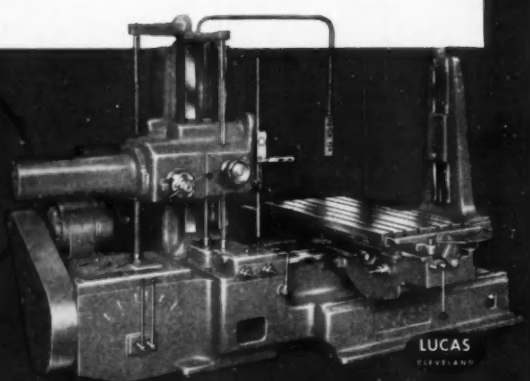
You can do 'most any job on a

LUCAS

And . . . because you can do such a wide variety of operations on a Horizontal Boring Machine, it is today one of the most CRITICALLY NEEDED machine tools in the entire re-armament program.

The overwhelming demand for the LUCAS Horizontal Boring Machine, which embodies every important design improvement, many exclusive with Lucas, has built up a backlog of priority orders which make short time deliveries difficult.

Therefore . . . in appreciation of your preference for Lucas Machines, we gladly offer our services and suggestions on how better methods and improved operating practices can help you to step-up production on your present Boring Machine equipment until your new LUCAS can be delivered.



LUCAS *Precision*

For better Power Steering

EATON Permanent Mold Gray Iron Castings

Send for your copy of the illustrated booklet, "A Picture Tour of the Eaton Permanent Mold Foundry."

Free machinability
Dense, non-porous structure
Uniform structure throughout the casting
Freedom from leakage under pressure
Machines to high, mirror-like finish
Properly annealed; no growth or distortion after machining

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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

No Place for a Cracked Casting!

Inspecting castings under black light with automatic ZA-19 Zyglo Unit

How "CATERPILLAR"

- Gets Better Castings
- Eliminates Wasted Machining on Defective Castings
- Insures Unfailing Safety

USING AUTOMATIC CONVEYORIZED ZYGLO*

There's no place in "Caterpillar" machines for parts that may fail prematurely.

To safeguard the quality of its malleable castings Caterpillar Tractor Co. has for years used Magnaflux* and Zyglo* for receiving inspection. Lately a big, automatic ZA-19 Zyglo Unit has been added to provide highest speed inspection of a wide variety of castings.

By spotting defective castings *before* machining, this Zyglo Unit has substantially reduced machining time and costs. It is improving quality by revealing defects caused by variables in casting and enabling correction of foundry methods. Finally, it insures that no defective casting will find its way into a "Caterpillar" unit.

The Zyglo inspection is fast, simple and positive. Conveying and processing of castings and application of Zyglo fluorescent penetrant are fully automatic. The penetrant enters every crack or porosity defect. Then in the Zyglo inspection booth these defects are instantly revealed under black light as glowing indications.

Whether or not your inspection needs are like those of "Caterpillar", Zyglo or Magnaflux Magnetic Particle Inspection can in all probability give you similar savings and improved quality control. Ask an expert Magnaflux engineer to sit in with you soon.

Write for booklets on Zyglo and Magnaflux.

** Magnaflux and Zyglo are U. S. Registered Trademarks of Magnaflux Corporation.*

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Hydraulic Power Steering for Cars . . . Trucks . . . Buses . . . Tractors . . . Earth Movers . . . Military Vehicles

Defense

Produce MORE goods at LOWER costs with TRADE Verson MARK presses

A "guns and butter" economy puts more pressure on production than we have ever known short of all out war. But with metal working equipment in short supply, machinery programs must be planned well ahead. If your needs include presses or press brakes, we would like to show you the many recent advancements engineered by Verson to make it possible to produce more goods, more efficiently.

While we are presently operating night and day in an effort to meet the tremendous demand for Verson equipment, our engineers will welcome the opportunity to assist you in your long range planning and show you how modern stamping techniques developed by Verson can help you produce more efficiently.

800 ton Verson Hydraulic press used by Stolper Steel Products Corp., Milwaukee, to form military gasoline cans. (Photo Courtesy Milwaukee Sentinel.)

Originators and Pioneers of Allsteel Stamping Press Construction

VERSON ALLSTEEL PRESS COMPANY

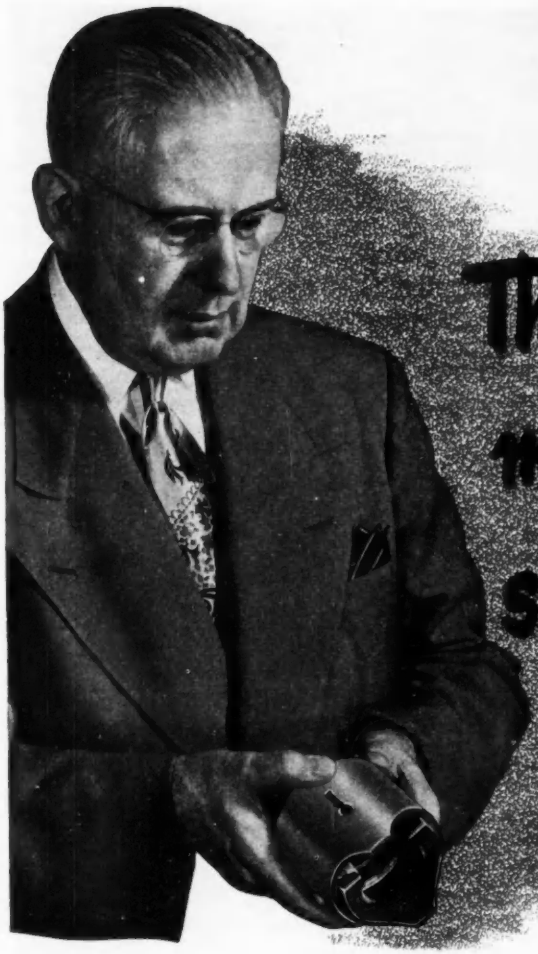
9307 South Kenwood Avenue, Chicago 19, Illinois **So. Lamar at Ledbetter Dr., Dallas 15, Texas**

A VERSON PRESS FOR EVERY JOB FROM 60 TONS UP

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING
DIE CUSHIONS • COMPRESSION AND TRANSFER MOLDING PRESSES

ANOTHER THOMPSON DEVELOPMENT

Three ring controlled aluminum pistons for high compression engines with scalloped skirt.



Thompson packs more power into smaller packages

NEW opportunities for cutting costs of intricate parts are being opened up by Thompson Products' advanced developments in casting light metals in permanent mold and high pressure dies. In many fields, ferrous castings are being replaced by more efficient light alloys of aluminum and magnesium. Records show resulting benefits to industry to stronger, more durable products requiring considerably less machining and finishing, and better heat conductivity. Through Thompson's unique developments in quality control and moulding methods, dependable uniformity from piece to piece is eliminating costly scrap losses.

Thompson's creative engineers will gladly put their many years of experience to work for you by showing where and how you, too, can simplify your operations with light metals and save on costs. Simply write Thompson Products, Inc., Light Metals Division, 2269 Ashland Road, Cleveland 3, Ohio.

Thompson Products

LIGHT METALS DIVISION

2269 Ashland Road • Cleveland 3, Ohio

Other Examples of How Thompson Light Metals Serve Industry: **End Frames for Fractional Horsepower Motors • Housings for Garbage Disposal Units • Fan Blades for Industrial Ventilators • Fluid Drives for Automotive Transmissions • Bazookas for Army Ordinance**

Towmotor Certified Job Studies show how other companies in *your* industry, with problems just like *your* problems, have cut production costs, increased output per man-hour, handled more tonnage . . . SAVED MONEY IN EVERY WAY . . . with Towmotor Mass Handling. Packed with helpful information, and illustrated with on-the-job photos, Towmotor Certified Job Studies clearly picture BIG SAVINGS on those jobs with which YOU are most familiar.

Look at these typical TOWMOTOR SAVINGS

- *Car unloading costs cut as much as 70% in many plants*
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- *A retail warehouse saves $635 weekly*
- *A canned goods warehouse cut car loading costs 75%*
- *An auto parts maker saves 160 man-hours weekly*
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See how YOU can reduce costs in all phases of Receiving, Processing, Storage and Distribution. Write today for Job Studies covering your industry.

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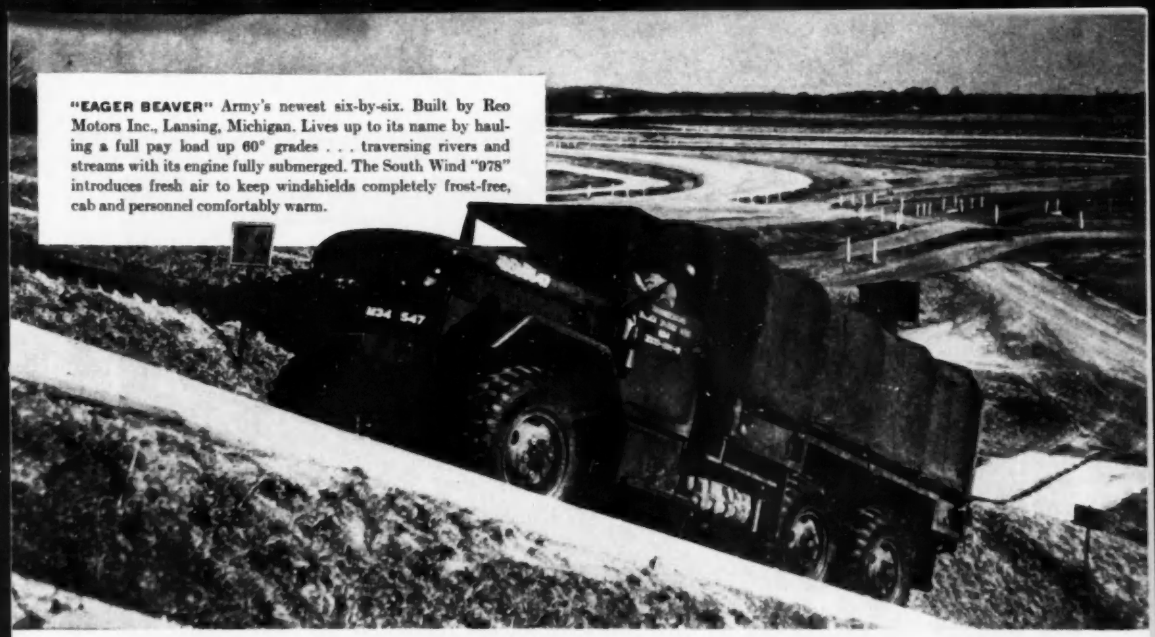
THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS
RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

*HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT **AMERICANISM** TODAY?*



"EAGER BEAVER" Army's newest six-by-six. Built by Reo Motors Inc., Lansing, Michigan. Lives up to its name by hauling a full pay load up 60° grades . . . traversing rivers and streams with its engine fully submerged. The South Wind "978" introduces fresh air to keep windshields completely frost-free, cab and personnel comfortably warm.

NEWEST MILITARY VEHICLES CONQUER SUB-ZERO COLD

Reveal Details of Revolutionary New Heating Development for Army

Now ready to roll. Specially equipped to keep rolling under the severest weather conditions! These new Army vehicles boast increased personnel comfort, greater efficiency in sub-zero cold—all the results of an amazing new military heater: the South Wind "978."

Simplified in design. Compact. This rugged forced air heater preheats, heats, and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat.

Built to Army Ordnance specifications, the "978" has been standardized by the Army for its winterization program. And because of its many exclusive advantages, promises to be influential in fashioning future designs for commercial car heating, too.

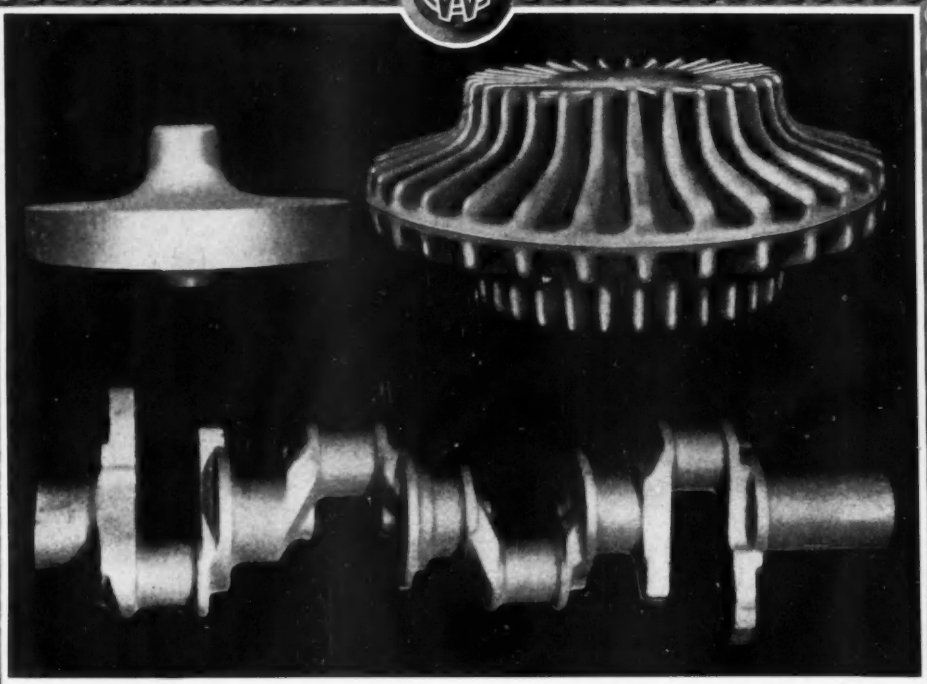
ACT NOW: Find out how this revolutionary new "978" military heater can effectively answer your vehicle heating and engine pre-heating requirements. Get the experienced counsel of a trained field engineer. Wire, write or phone Stewart-Warner Corporation, South Wind Division, Dept. E-12, 1514 Drover Street, Indianapolis 7, Indiana. Do it today.

STEWART-WARNER

PERSONNEL HEATING *South Wind*
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

12 WHEELED eight ton heavy duty cargo carrier. South Wind "winterized." A "978" heater keeps frost off the windshields . . . freezing cold outside the cab.

SELF-PROPELLED artillery. New M 41 Motor Carriage with 155 mm. Howitzer. Equipped with two South Wind "978's" for personnel heating, and for heating gun components.



Wyman-Gordon — specialists in the vital forgings of the internal combustion engine since its inception — is today the largest producer of crankshafts for the automotive industry and of all types of forgings for the aircraft industry. Be it crankshafts and other vital forgings for the piston type engines or turbine wheels and impellers for turbo jets — there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN

NEW AN 737 CLAMP by GARRETT

DOUBLE PROTECTION SAFE CONNECTIONS

APPROVED FOR AIRCRAFT USE BY THE ARMED FORCES

Quality proved unsurpassed in millions of hose clamps is now being built into the new Garrett AN 737 Hose Clamp.

This new stainless-steel, radial type hose clamp offers double protection—it is constructed so that it is mechanically fastened as well as spot-welded. Double protection on every connection . . . meets the specifications of the Armed Forces.

This new Garrett AN 737 with the floating bridge and thumb-screw assures safe, sure connections on all types of aircraft installations. Order now the size required by your contract work.

Garrett is in production on all types of hose clamps to meet Armed Forces specifications:

QS 100 and AN 748 Type
CMAX 10 Tank Ordnance
Automotive Type

For prompt deliveries on all hose clamps write or wire Garrett, D & Tioga Sts., Philadelphia 34, Pa.

OTHER GARRETT HOSE CLAMPS

QS 100 & AN748 Type

Worm-type, self locking screw assures uniform instant adjustment. Approved and used by Armed Forces. High carbon steel, plated to prevent corrosion.

AUTOMOTIVE TYPE

Screw type adjustment, "scarfed" tongue to prevent pinching of hose. Staked bolt plus captive nut prevents loss of parts. Rustproofed for long service.

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D & TIOGA STREETS PHILADELPHIA 34, PA.

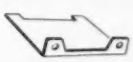
Garrett
OF PENNSYLVANIA

MANUFACTURERS OF

LOCK WASHERS

FLAT WASHERS

HOSE CLAMPS



STAMPINGS

Here's why it pays to know your HSM

HONEYWELL SUPPLIES MAN

This butt-welded thermocouple is faster because: (1) Butt-welding replaces mass of metal at hot junction; (2) Shape of wire prevents insulator from dissipating heat and affecting response.

J. F. KRAMER, Honeywell Supplies Man in the Cleveland area, tells Mr. George Taylor of the S. K. Wellman Co. all about the new Brown butt-welded thermocouple . . . after describing the benefits of the HSM Plan for buying pyrometer supplies.

You'll be pleasantly surprised when *you learn* how *the plan* can add new convenience and economy to your pyrometer supplies purchasing, too!

There's a Honeywell Supplies Man near you . . . at your local Honeywell office . . . no further away than your phone. Call him in today, and you'll take an easy step in the right direction.

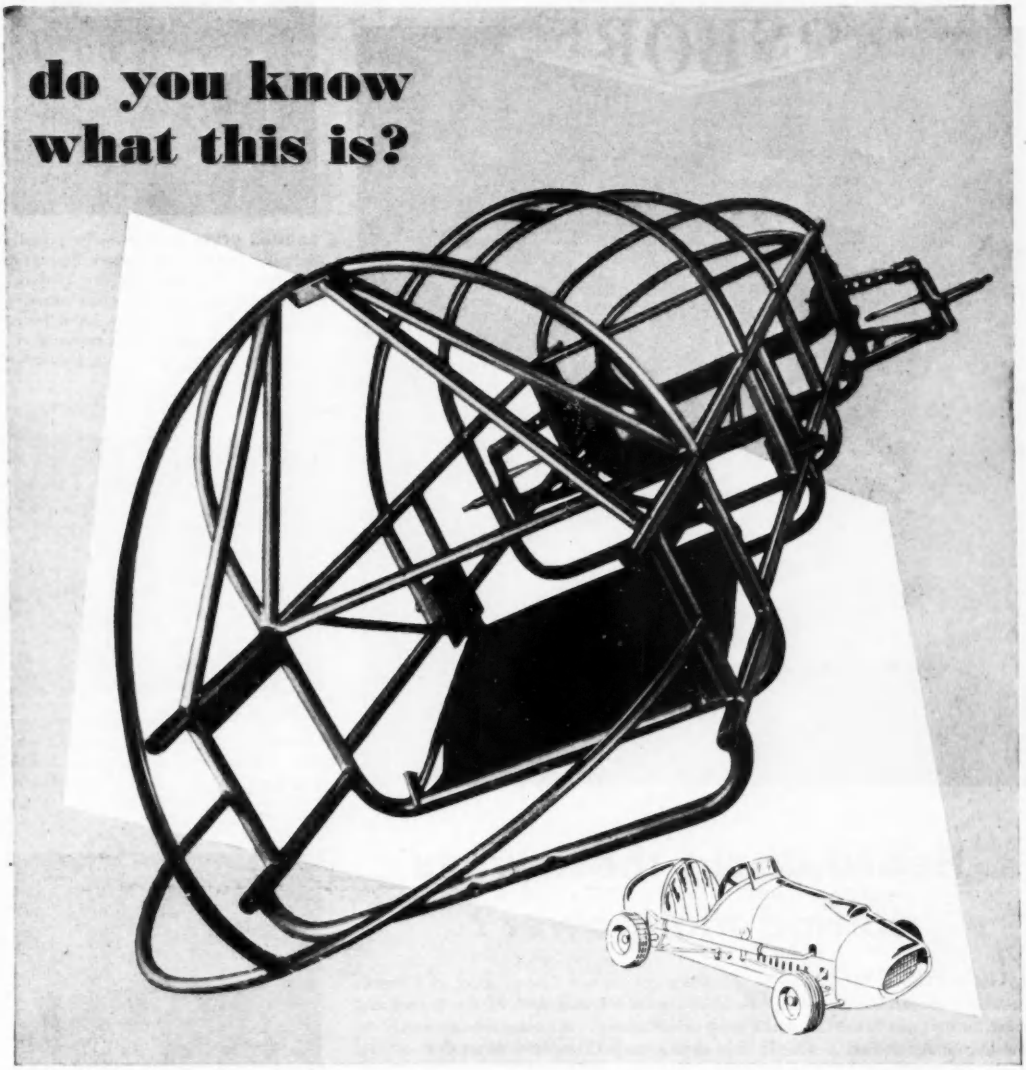
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4548 Wayne Ave., Philadelphia 44, Pa. Stocking points in Philadelphia, Cleveland, Chicago, Atlanta, Houston, Los Angeles and San Francisco.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

● *Important Reference Data*

Write for Specification Sheet No. 306 on the butt-welded thermocouple . . . and for new Pyrometer Supplies Buyers' Guide No. 180-4.

do you know what this is?



You're right if you tagged it as a frame for a midget racer. And, chances are, you know metal fabrication and talk the same language as the men of Harter who made this little car as a hobby. Perhaps the most interesting fact about this car is that in a few days it progressed from a mere doodle on a designer's pad to actual production. This is typical of the ability of the Harter organization to translate quickly an idea into a finished product. This quality makes Harter a splendid subcontractor when you need help *fast* to make promised delivery on defense contracts.

HARTER

STEEL POSTURE CHAIRS

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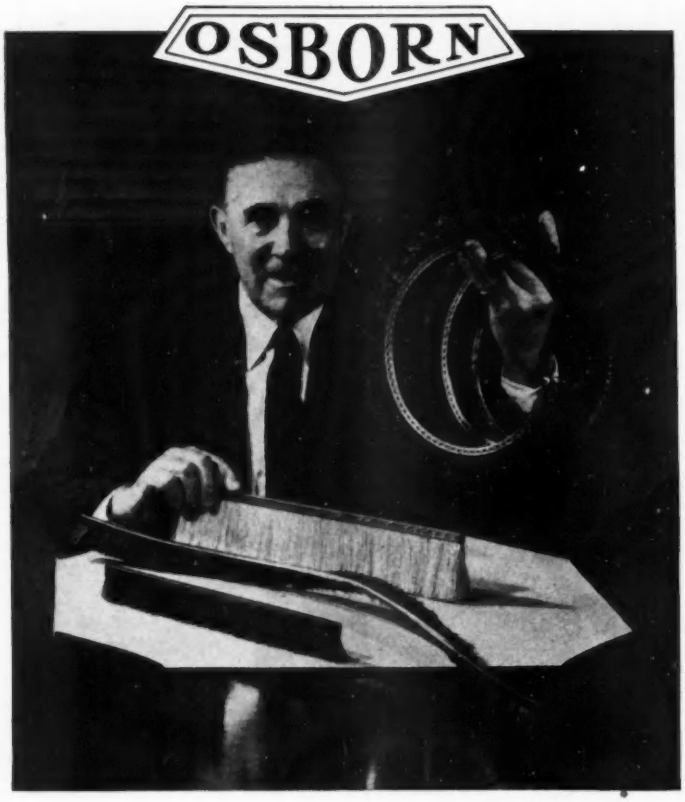
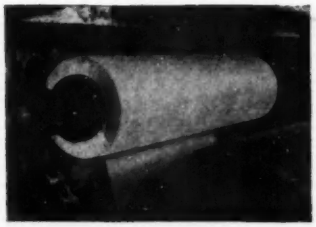
Write **Harter Corporation or phone Sturgis 781 for complete information on Harter's metal forming and fabrication facilities. Harter Corporation, 135 Prairie Avenue, Sturgis, Michigan.**





SCRUBS STEEL. Master Strip wound helically around a steel core becomes an Osborn Heli-Master® Brush. Here it scrubs strip steel preparatory to electrolytic tinning. In this mill, six of these Heli-Master Brushes clean the strip at 1500 feet per minute, working around the clock.

PREPARES GLASS. Here Heli-Master brushes clean glass and apply a uniform film of binder for silvering compound. Replace hand operation. Steps up mirror production and cuts rejects.

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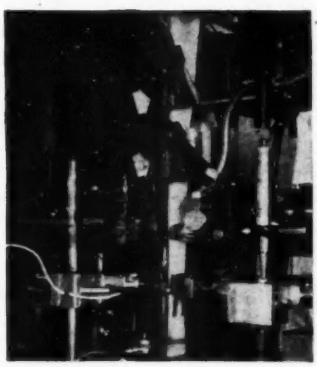
Master Strip can be used in special mountings—straight, curved or coiled in a helix. Its fill material can be wire, hair, fibre, textiles or synthetics in trim lengths from 1 to 10 inches. It comes in any length up to 120 inches. Name your problem—cleaning, scrubbing, finishing or many others. It can be matched to *your* job!

The nearby **O**sborn **B**rushing **A**nalyst will gladly study *your* manufacturing operations and explain how you can benefit with this versatile tool! Call today or write *The Osborn Manufacturing Company, Dept. 602, 5401 Hamilton Avenue,* Cleveland 14, Ohio.



KILLS STATIC. These brass wire Strip Brushes are used in a tea-bagging machine to remove static from the bag paper. Speeds filling and sealing of bags.

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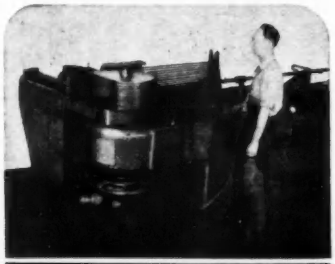
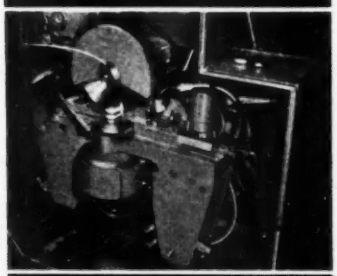
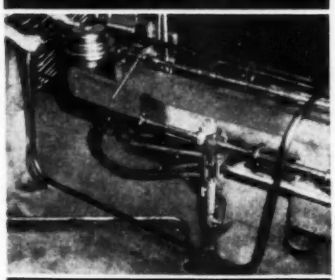


1. MULTIPLE GROOVE DIE — on Pines Size 3 Automatic Bending Machine forms ten 7/16" x 67-1/2" steel rods simultaneously to a 22" radius for farm implements.

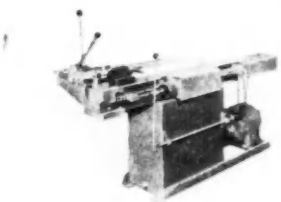


2. DOUBLE DIE AND CUT-OFF SETUP — on Pines Size 3/4 Automatic Bender. Produces 3/4" copper return bends to 7/8" c/l radii automatically, two pieces at a time.

4. FORMING BLOWER HOUSINGS ON PINES ROTARY BENDER — bends irregular curve (radii of 5-17/32" to 7-3/4") in 5-1/2" width stock at a speed of 89 pieces per hour. Floating bronze pod acts as a wiper shoe, maintains uniform pressure, assures smooth, wrinkle-free results.



3. TRIPLE RADIUS SETUP — on Pines Size 3/4 Automatic Bender handles three different radii and six 90-degree bends in 1-1/8" tubing in fast sequence. Increases truck seat frame output with less handling.



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NATIONAL OIL SEAL LOGBOOK

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Where Pressure Lubricating Systems are Employed— Dependable Oil Seal Performance is a Must

Many machinery manufacturers are adopting pressure lubricating systems in their new designs. This method of lubrication insures longer trouble-free performance, reduces maintenance costs and eliminates shut-down time ordinarily required for periodic manual greasing.

The new Emsco "GB-800" oil field drilling rig is a fine example of heavy equipment which employs pressure lubrication. In this new unit more than 25 oil seals are employed on shafts ranging in size from $1\frac{1}{2}$ to 10 inches. As shown in the photo of the drawworks (Fig. 1), three engines, transmission and hoist are mounted on a common skid and can be transported as a unit. The cut-away drawing (Fig. 2) is of the main hoist drum shaft assembly. The pressure lubricating system is piped to bearings on the main shaft and in the idler sprocket. Oil flows through the bearing assembly flushing out all dirt or other foreign matter.

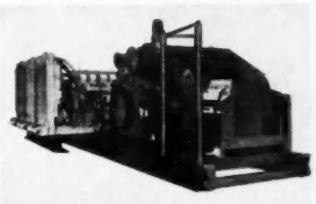

Fig. 1—New Emsco "GB-800" skid-mounted rig for portable derrick operation

In this drum shaft section, five single-lip, spring-loaded National 50,000 series seals (Fig. 3) are employed. Near the clutch position (A) two of these seals are mounted in tandem to provide protection against leakage into the clutch. The lubricating system places the relatively large oil seals under a constant internal pressure. The equipment is also subjected to frequent reversing and heavy load shocks resulting in a strenuous heavy duty sealing problem.

National leather sealing members are specially treated to retain their shape and maintain an effective seal when subjected to such extraordinary operating conditions. These same type National leather seals have established performance records in many heavy duty applications on shafts up to three feet in diameter.

If you are working on a design for heavy duty equipment, remember: National Oil Seals are, daily, establishing performance records. The seals you need are probably listed among National standard designs already in production for you. Investigate and see for yourself. No cost or obligation, of course.

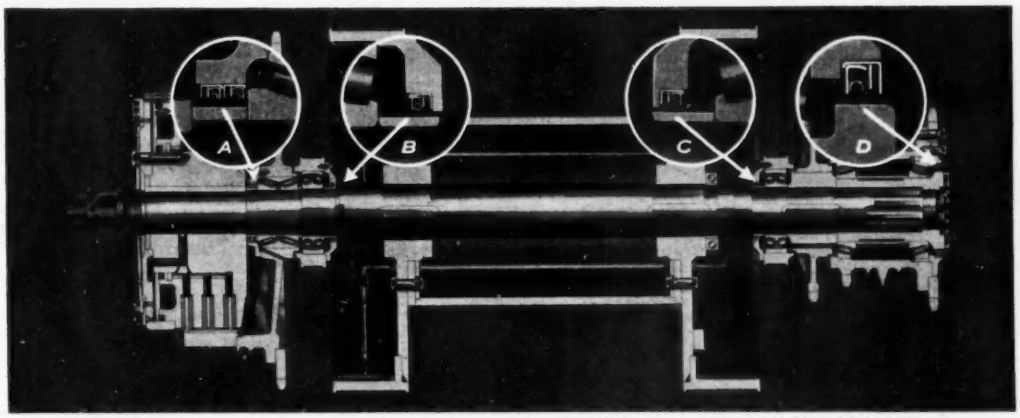

Fig. 2—Cut-away drawing showing position of five oil seals on main hoist drum shaft assembly of Emsco "GB-800" oil field drilling rig

Fig. 3—National 50,000 series leather oil seal

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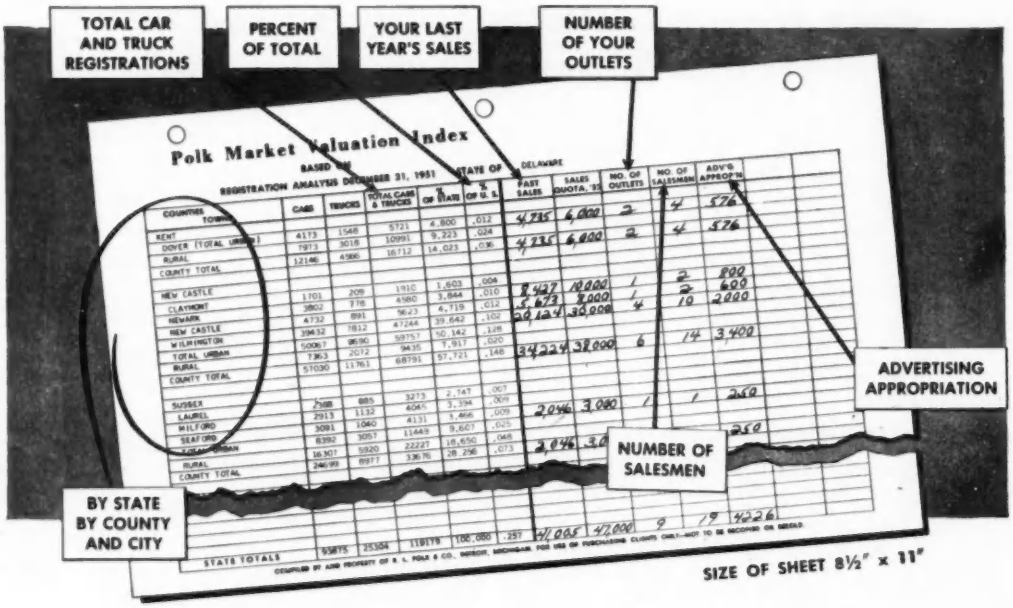
TOTAL CAR AND TRUCK REGISTRATIONS
PERCENT OF TOTAL
YOUR LAST YEAR'S SALES
NUMBER OF YOUR OUTLETS
ADVERTISING APPROPRIATION
NUMBER OF SALESMEN
BY STATE BY COUNTY AND CITY
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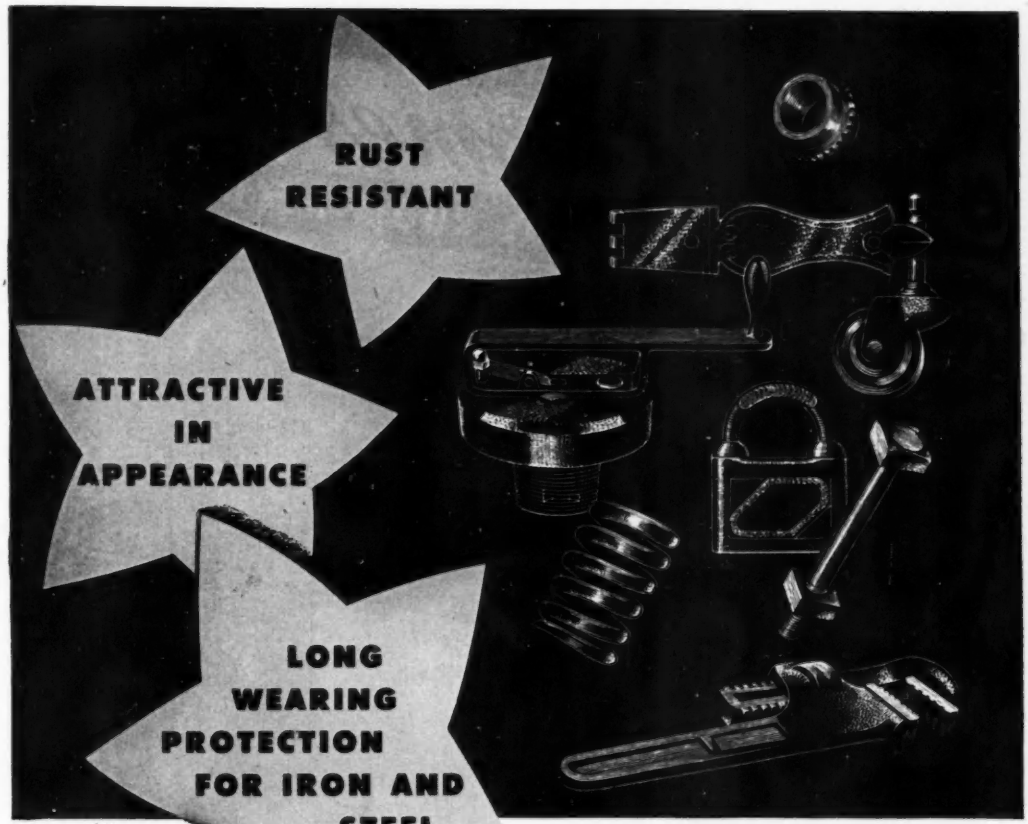
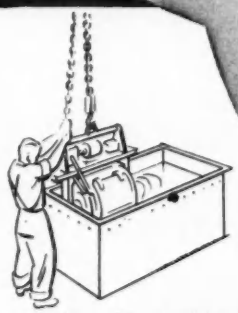


—PARCO COMPOUND



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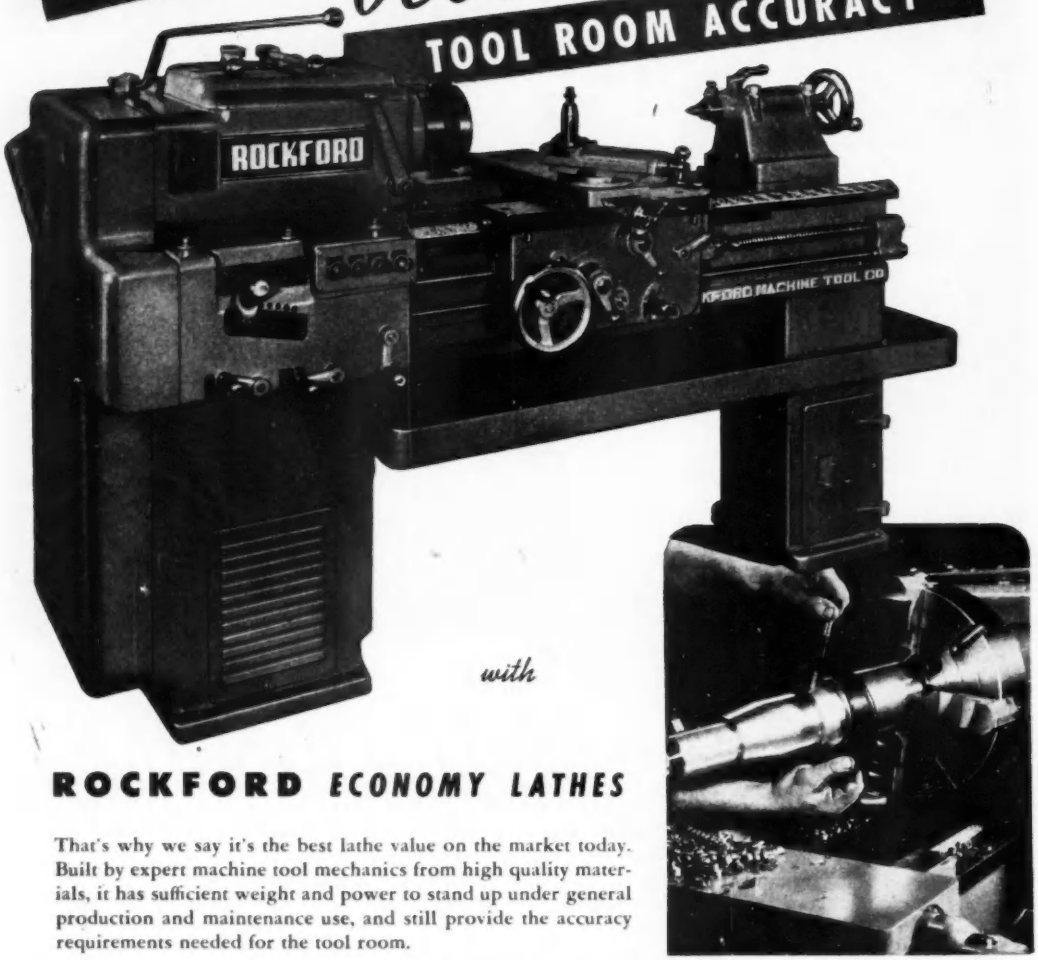

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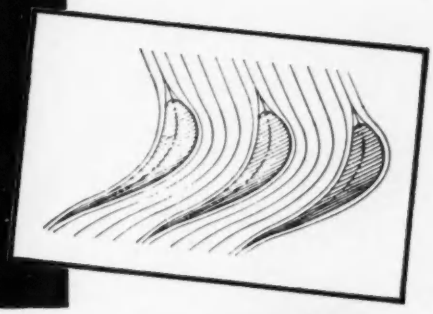

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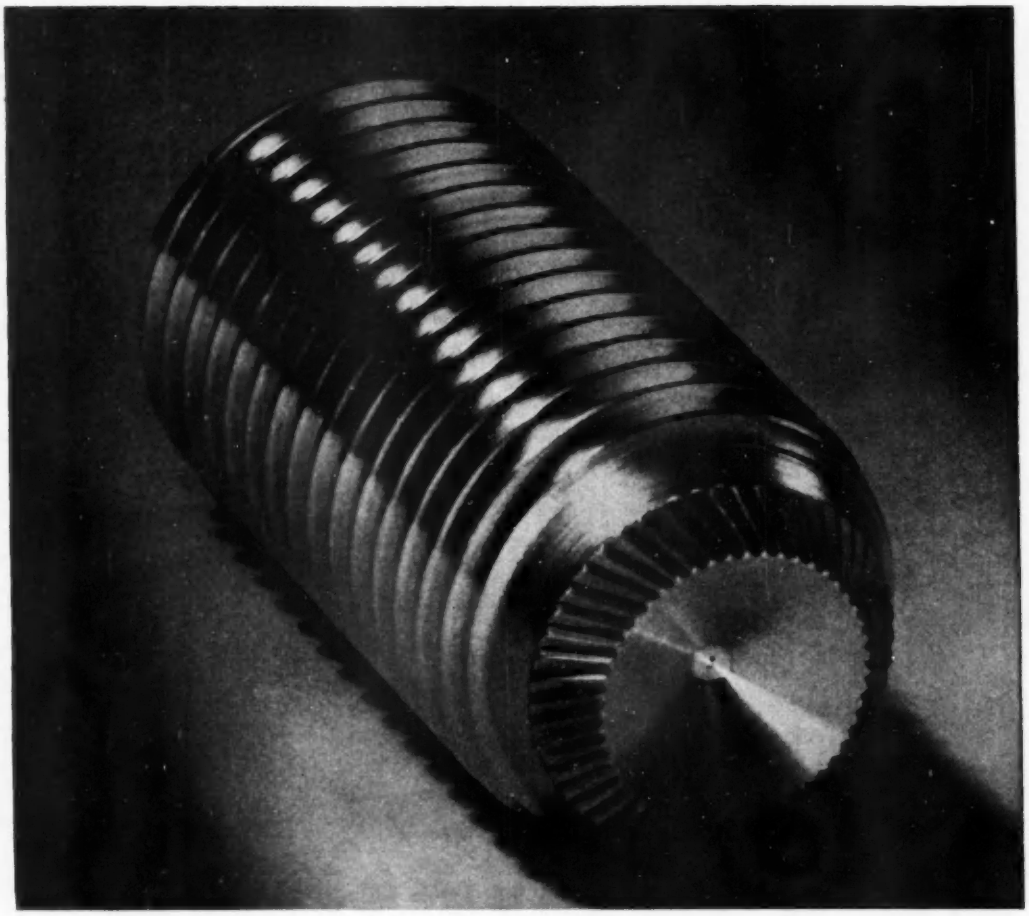

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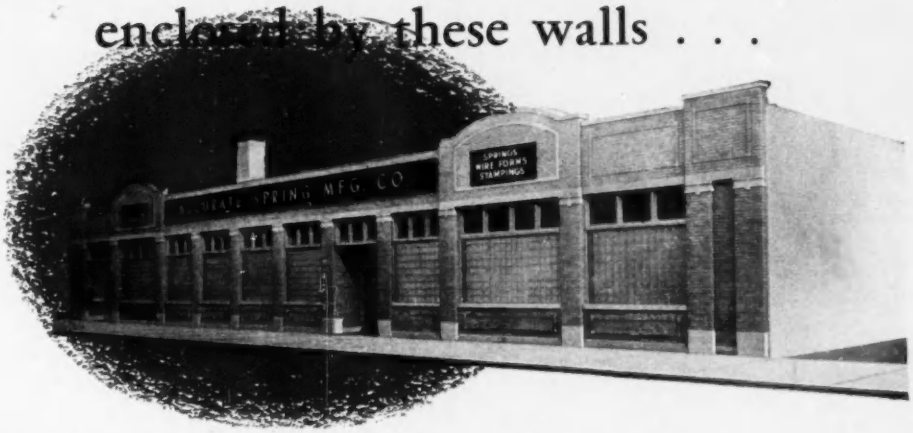

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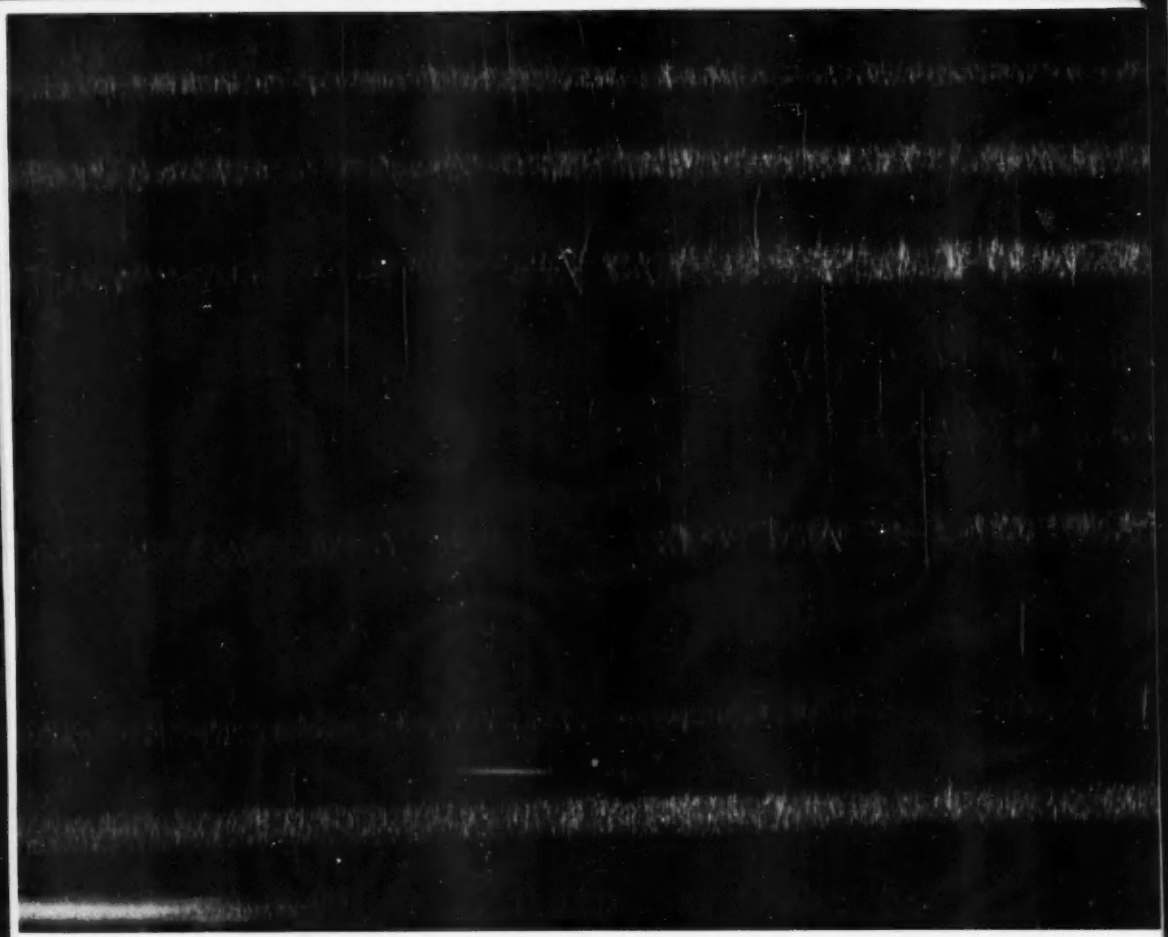

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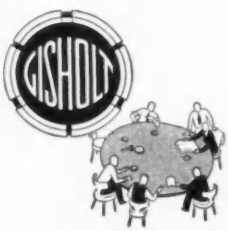

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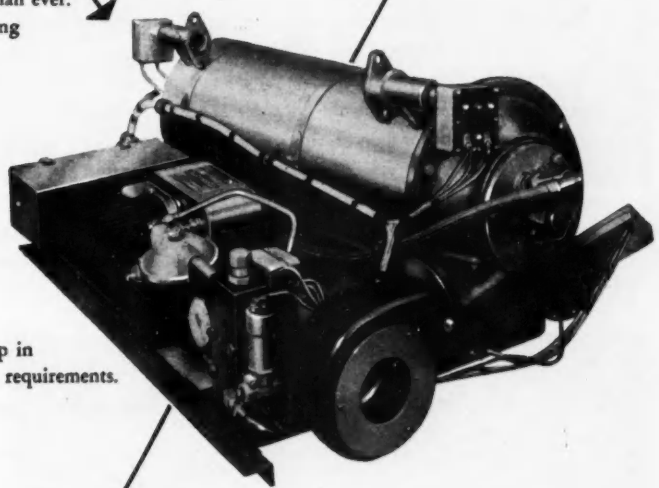

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Jan-P-197, Packaging and Preservation of Anti-Friction Bearings and Bearing Parts, plus interim instruction July 19, 1951 (Army Ordnance only). Method 1A-8 modified. (Load limit 5 lbs.)

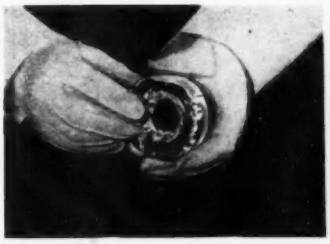
READ AND SAVE THIS PAGE TO START YOUR PICTURE-STORY FILE!

MILITARY PACKAGING SIMPLIFIED #1 of a series

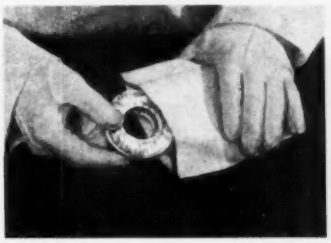
1. After thorough cleaning and preservative applied [MIL-G-10924 (ORD)], place bearing on sheet of aluminum foil. For sealed or instrument type bearing use preservative MIL-G-3278.

2. Roll foil around bearing with a liberal amount of foil extending on both sides, and with ample overlap using "lock" fold. Gloves prevent pick-up of perspiration which might cause corrosion.

3. Press foil through opening in the bearing in preparation for "doughnut" wrap. Note how easily foil conforms to shape. This eliminates any necessity of taping or tying.



4. Complete "doughnut" wrap by pressing foil through on the other side. Press tightly to force out moisture-laden air. (For bearings too small for "doughnut" wrap, completely overwrap using "lock" folds on long seam and end folds.)



5. Insert foil-wrapped bearing in envelope made of Reynolds RM-112, a Class A scrim-backed four-part sheet. Withdraw as much moisture laden air as possible and heat-seal open end.

6. Package ready for shipping container. Note how envelope conforms despite extra strength and protection of scrim-backed material. (For assemblies over 5 lbs. use Methods 1A-1, 1A-2 or 1A-5, with aluminum foil as intimate greaseproof wrap.)

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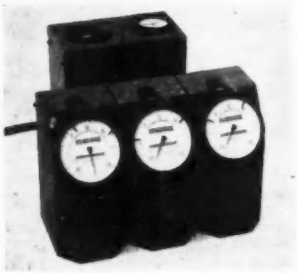

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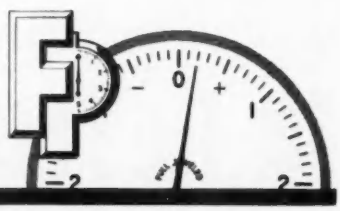

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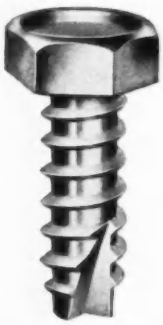

TYPE 25

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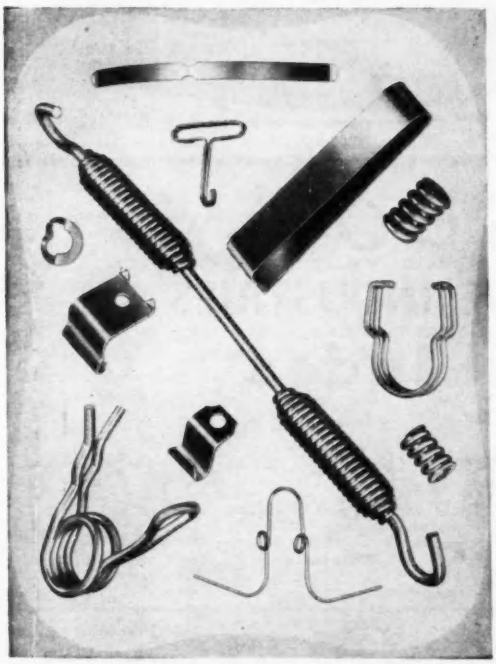

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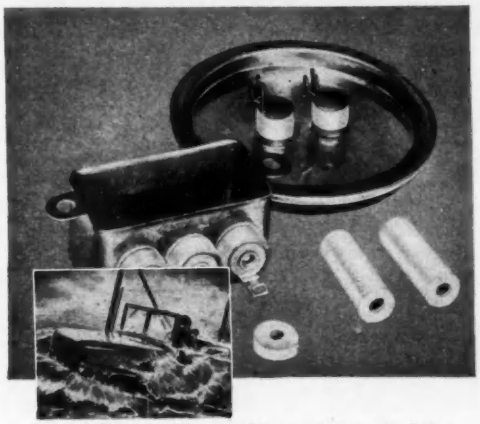

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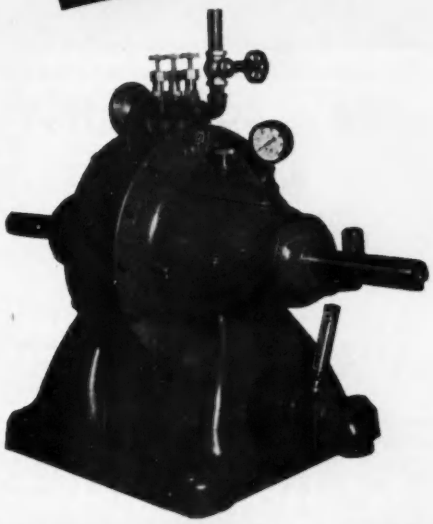

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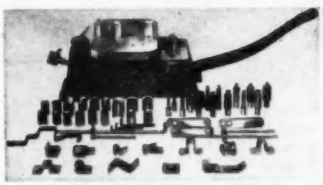

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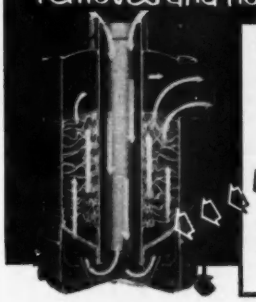

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Donaldson AIR CLEANERS

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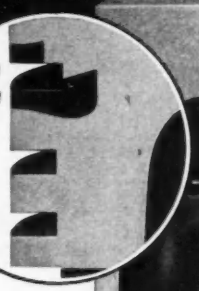

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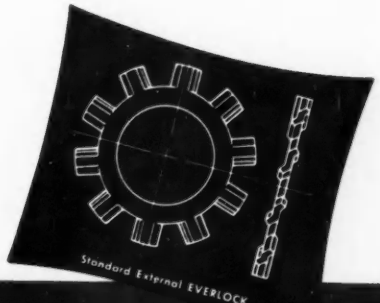

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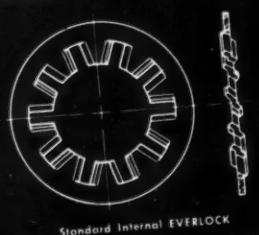

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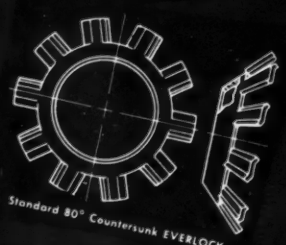

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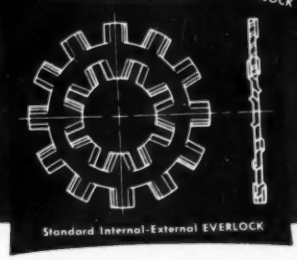

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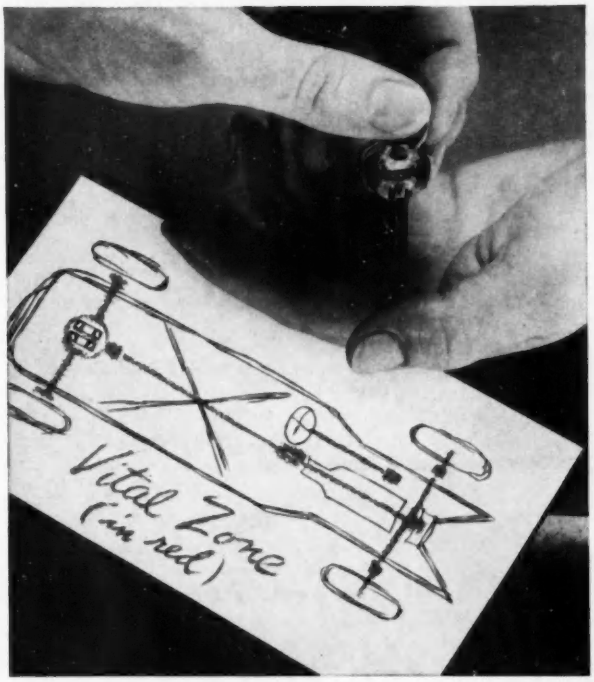
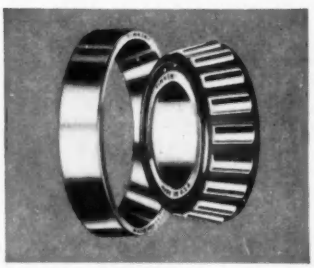


How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":

YOUR ENGINEERS. The Timken Company's engineering staff is always available to help solve bearing mounting problems and to simplify assembly. This service is unequalled in the bearing business. And it's one of the big reasons why you get more value with Timken bearings.



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10. Most dependable source of supply

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